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AUGUSTUS RADCLIFFE GROTE, A. M.

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No. 1.

TO A. R. GROTE.

Lover of Night, in other lands than mine,
Of night made mystical by many a sprite
And bashful woodland fancies, made divine
By the moon's shining and the still starlight.

I greet thee, my twin Spirit. Tell thy tale
More often to thy listeners over seas :
Tell how the shadows brood o'er hill and vale :
Tell how the voices whisper on the breeze.

Call forth thy spectres robed in gauzy light,
Thy shadowy Indians and thy old-world fays.
So shall the Old World and the New unite
On Nature's bye-paths and Night's silent ways.

And when one day the still procession moves
To seek those realms that men call Heaven and Hell,
We twain may steal an hour, if none reproves,
To watch the Moths in meads of asphodel.*

G. M. A. HEWETT,
St. Winefride, Winchester, England.

AUGUSTUS RADCLIFFE GROTE.

We have great pleasure in presenting, with the first number of a new volume, the accompanying likeness of our much esteemed friend and constant contributor, Mr. A. R. GROTE, A. M., of Bremen, Germany. His name is familiar to every reader of the CANADIAN ENTOMOLOGIST, to which he began to contribute in 1870, when it was in its second volume, and his work is known and valued by every student and collector of North American Lepidoptera. We wish him, and all our friends and correspondents, a very happy and prosperous New Year. C. J. S. B.

*Printed in the Entomologist's Record and Journal of Variation, March 15th, 1894, page 76.

THE GENERA IN THE NOCTUIDÆ.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

It must be conceded that there is a want of correspondence between authors as to the generic names employed in the *Noctuidæ*; perhaps a greater than in other families of Lepidoptera. The main cause appears to lie in the two systems of classification. The old system, under which the species were assorted into genera from their superficial characters, found its highest expression in the works of Guenée. The new system, commenced by Stephens and Lederer, deals with the ultimate structure of certain parts, and is yet working out its results in the direction which all systems must pursue, that of perfectly reflecting in our books the order which obtains in nature itself. To this end the new system must extend itself, and is extending itself, witness the work of Packard and Dyar, to a study of the insect in all its stages. Here a narrow insistence on any one character must defeat the general aim.

The want of correspondence above spoken of in the generic titles of the *Noctuidæ* is, then, greatly owing to the different systems which underlie the arrangement. Perhaps, in the one case, I ought to say the want of system. While, in the butterflies, there exists a more distinctly expressed correspondence between superficial characters, form, colour, pattern, size, and structural characters, this correspondence is greatly wanting in the moths, where series of very similar appearing species are found to be structurally very different. While, then, ancient and modern genera in the butterflies more nearly cover each other, and the generic types are more easily fixed upon as a whole, there is a wider divergence in the *Noctuidæ*. For instance, I will take the genus *Xylena*, Hübn., Tent. The type and sole species (therefore the type) of this genus is *X. lithoxylea*. This insect belongs to Stephens's later genus *Xylophasia*, a genus recognized variously as either distinct from or as a group of *Hadena*, or, again, as not being really separable by valid characters. The genus *Xylena*, Hübn., 1806, is then, a *Hadenoid* genus, proposed for a *Hadenoid* species. In 1816, Ochsenheimer, 4, 85, adopts the spelling and cites Hübner for the genus *Xylena*. But now comes the old system, and Ochsenheimer arranges 30 species under his genus *Xylena*, most of them strongly dissonant in structure. The modern system separates Ochsenheimer's species of *Xylena*, and breaks up his genus under some 12 different genera, and places these in different groups up and down in the family. The type of *Xylena* (*lithoxylea*) is also included by Ochsenheimer, and,

for his species, the genera *Lithomia*, *Calocampa*, *Lithophane*, *Hadena*, *Xylena*, *Actinotia*, *Dipterygia*, *Chariclea*, *Calophasia*, *Asteroscopus*, *Scotochrosta*, and yet others are now used. Unfortunately the generic title, becoming altered in spelling to *Xylina*, has been retained for the Lithophanoid forms, instead of the Hadenoid form, for which it was intended and to which it properly belongs. This mistake I set right in 1876; I show that *Xylophasia* is a synonym of *Xylena*, and that for the genus *Xylina* of authors the name *Lithophane* (1816) must be used. Only through such researches can we arrive at the certain titles of our genera, and if we would one day reach a stable nomenclature, if our aim is fixity and not laxity, the result of such studies must be adopted and held fast.

The type of each genus in the *Noctuidæ* should clearly be first positively ascertained, and the structural features of such type fully exposed. By comparison we can then group around such types the other species. We can ascertain the reasonable limits of the genera, weigh the characters of outlying forms which obscure these limits, and, through comparative studies in all stages, arrive at that condition of affairs in classification where a certain generic term covers a certain total structure, and its use calls up a picture of the greatest number of ascertained facts. The time will then come when the present personal, opinionative use of generic terms will give way to the scientific, impersonal one, when authority will no longer usurp the place of reason and research.

Acting again unfavourably upon the attainment of such a state of affairs in literature and conversation, is the tendency to make a difference, where in reality none exists, between authors as to the validity of their names arising from the alleged want of technical completion of publication. I am here concerned only with generic titles. I hope to show elsewhere that specific titles owe their recognition to a correspondence between the object and the published description, and that, where the supposed "type" of the original describer contradicts at all essentially the original text, the "type" must be considered spurious, since the reason for the name is to be found in literature, not in a labelled specimen. In generic titles we are, however, solely concerned with literature, because generic titles deal almost exclusively with already described species as a matter of fact. New genera, based only on new species, depend also largely upon the proper identification of the species, but these instances do not affect the older generic titles and play no part in our present investigations.

The difference made between authors, to which I above allude, as to generic names, is, that catalogue names, to which no description is appended, but under which the species are simply listed, are held to be of less value. But we can always know what is meant by them, and all that we seek in the present case is to find out an exact generic title for any one species as an impersonal literary fact. In an opposite view no criterion exists by which we can test the description. Almost all the older descriptions, so far as matter is concerned, are waste paper. Take for instance the cases of Walker and Hübner. Walker's generic descriptions in the *Noctuidæ* contain statements out of which we can usually make nothing. Take, for instance, that of *Feltia*. What is said would cover almost any of the entire *Noctuina*. The synonyms made by Walker would not and could not have been detected unless I, or some one else, had inspected his type. Had any one told him that his *Feltia ducens* was a specimen of *Agrotis jaculifera*, Guen. (= *subgothica* of Authors nec Haworth), Walker would have been obliged for the information, and simply thrown his label and MS. into the waste paper basket, where both rightly belonged. The real difference between Walker and Hübner is, that Walker says more and conveys little, while Hübner says little and conveys more. Practically we can never be at a loss for the proper use of a single generic title published by Hübner, so that under the law of priority we can properly refer all of them, without, as is often the case with Walker, first having to identify a badly described species. Where both authors propose genera for known species, there is in reason no difference to be made between them. Walker's diagnoses are generally no better than no description at all; not unfrequently are they positively misleading.

Leaving these two authors, we come to Ochsenheimer, and here the fact presents itself that Ochsenheimer's names which did not meet the adverse fate of Hubner's in the Tentamen, are also no better founded, and are "catalogue names" without a description. What sort of a description could Ochsenheimer indeed have given? So that several names now in use and never doubted have the same original right as Hübner's Tentamen names. I think this fact ought to lend my argument conclusive weight, added to the fact, proven by me, that Ochsenheimer adopted Hübner's names, and considered the Tentamen as properly published and as of authority. Ochsenheimer apologizes, in fact, for not having adopted more of Hübner's titles, because the sheet of the Tenta-

men had not reached him earlier. Probably some of the opposition to Hübner had its origin in the prejudice against a multiplicity of genera. With all such matters of feeling science has nothing to do in its impersonal researches after an exact generic nomenclature. What we seek is a stable name for certain generic types of structure, not a choice between authorities.

All who have studied the recent progress in the classification of our North American Noctuidæ, will recognize the fact that it is being carried out upon the lines laid down by me in the pages of this journal, lines which I took up from the writings of Stephens and Lederer on the Old World fauna and applied to the arrangement of the North American species. The new catalogues adopt my groupings. Here and there my reference of a species to a wrong genus, from a neglect to examine the single type, having no microscope at hand, or from a fear of injuring it before its return, is corrected—some half a dozen—but, as a whole, the species remain as I arranged them, and what changes are made are the natural result of observations on larger material, and, in any event, more apparent than real. That our classification can be bettered is certain. No one lifetime is long enough, outside of other occupation, to finally study our nearly 2,000 species of owlet moths and make all the comparisons necessary with the European and South American faunæ. It is hardly necessary for me to say this in the way of apology for the incompleteness of my work. All our work is fragmentary and incomplete. This fact is often forgotten, usually forgotten by new or younger writers, as also that all undue and unjust criticism will tell in the end against the user of such a weapon. Underlying all our entomological activities is the individual person, the more or less educated character, the mental force which time and opportunity develops and cultivation softens and perfects. Even in our very nature itself we are dual; our actions are not always in accordance with our conceptions. I am reminded of this fact by an interesting statement of Prof. J. B. Smith's, who testifies to this duality (Proc. National Mus., XIV. 207) where he acknowledges that he had redescribed my *Mamestra purpurissata*, which has hairy eyes, as a species of *Hadena*, in which genus the eyes are naked. Prof. J. B. Smith says (l. c.): "How I came to refer the insect to *Hadena*, I can not now understand, since my memoranda show that I *knew* the eyes were hairy."

Here is, then, the place for me to correct a former citation (with regard to *Noctuid* genera) of mine in the Buffalo Check List, 1876. Hübner is

the first to restrict the use of the name *Gortyna* to the species *micacea*. His action makes it obligatory upon us to keep this type for *Gortyna*, and Guenée's name *Hydracia*, proposed for the same identical type, must, as I have always insisted, fall. But, in my Buffalo Check List, I give the Tentamen, instead of the Verzeichniss, as authority. The fact is not in any way changed by my mistake in the citation. The citation is, thus, properly: "*Gortyna*, Hübn., Verzeichniss, 1816, 232, *micacea*, only species and therefore type." But Ochsenheimer's work has, although of the same dating (1816), priority; since I understand the Verzeichniss was not published completely in 1816, and Hübner probably took the name from Ochsenheimer, who does not cite Hübner. So we must call the genus *Gortyna*, Ochs., 1816, with the type *micacea*, as restricted by Hubner. The rest of my citation is correct; but again, at the close, under *Ochria*, I have fallen into the mistake of saying that this name is proposed for *flavago*, alone, in the Verzeichniss. This error probably arose because *flavago* is mentioned by itself at the top of Hübner's page 234, and I overlooked the fact that, on page 233, he has two more. Again, this mistake does not alter my statement that we must use *Ochria* for the type *flavago*. Hübner's first species is a *Xanthia*; Guenée has taken out the second as the type of his genus *Dicycla*; there remains for *Ochria*, then, *flavago* ALONE. We must reverse (as I have done) the terms proposed by Lederer for these genera. While it is proverbially human to err, it is a wise dispensation of Providence that out of all our errors there comes light—if not for us, then for those who come after us.

LECANIUM FLETCHERI, CKL.

In the September (1893) number of the CANADIAN ENTOMOLOGIST, page 221, Mr. T. D. A. Cockerell described under the above name a *Lecanium* found at Ottawa upon an ornamental cedar on the Experimental Farm. Only a few specimens were found at that time upon three or four bushes of a shrub which we have under the name of *Thuja Sibirica*. About the middle of last June, when at Stittsville, Ont., 15 miles from here, I found a few more specimens of this species upon the native cedar (*Thuja occidentalis*). The shrubs upon which the first specimens were found were originally imported from France six years previously, and there was, of course, the possibility that the scale insect, although of an undescribed species, might have been imported with it and overlooked. As it has now been found, however, and in larger numbers, some miles from here, upon our native "White cedar," there is no longer any doubt that it is indigenous.

J. FLETCHER, Ottawa.

THE AMERICAN SPECIES OF PERINEURA.

BY ALEX. D. MACGILLIVRAY, ITHACA, N.Y.

The Abbe Provancher described two species of *Synairema* from North America, one from the Atlantic region and one from the Pacific region; a second species, from the Pacific region, is described below. The genus *Synairema* is considered as a synonym of *Perineura*, by Kirby.

1. The face, thorax, and legs marked with white *americana*, Prov.

The face, thorax, and legs black 2.

2. The posterior tibia wholly black *pacifica*, Prov.

The posterior tibia annulated with white *Kincaidia*, sp. nov.

Perineura americana, Prov.—♀ “Black; face below the antennæ; inner orbital lines reaching the occiput and thence curving inwards, mandibles, clypeus, palpi, genæ, scape underside, a spot on each side of the median lobe of mesothorax, a spot on tegulæ, scutellum, a point before and another one behind, apex of basal plates, pleura and pectus in parts, white. Antennæ long, slender, black, with a white spot on the scape underneath. Wings hyaline, nervures and stigma brown-black. Legs white, including coxæ and trochanters, the two anterior pairs with a black line exteriorly on their femora, tibiæ and tarsi; the posterior pair black, with coxæ, except a black spot outside, trochanters and basal third of femora, white; the spines of their tibiæ, except the tips, and a ring at the base of the first joint of the tarsus, also white. Abdomen elongated, black, shining, venter more or less whitish on the sides. Valves of the terebra black, shortly exerted.”

Length, .46 inch.

Habitat, Cap Rouge, P. Q., Canada.

Perineura pacifica, Prov.—♀ Black with the abdomen red. The head, thorax, feet, black without spots. Wings moderately smoky, the lanceolate cell contracted at middle, the costa and stigma black. Abdomen cylindrical, robust, red, with the first segment black, and a black spot, poorly defined, on the terminal segment. Length, .35 inch. (Translation.)

Habitat, Vancouver Island.

Perineura Kincaidia, n. sp.—♀ Black; the labrum at apex slightly ferruginous; the abdomen beyond the first segment ferruginous; the lateral sheaths of the ovipositor black; the apex of the anterior femur and the front side of anterior tibia, fuscous; the mandibles spotted with white; the posterior tibia above on apical third with a white band; the

inner spur of the anterior tibia stout, broad, bifurcate at apex; the outer spurs of the anterior tibia and those of the middle and posterior tibiæ long, slender and simple; antennæ stout, thicker at apex, the third segment one-third longer than fourth; clypeus deeply emarginate; wings smoky, darker at base; stigma and costa black; the marginal cross-vein originating in the lower posterior angle of the stigma, and joining the third submarginal cell at the end of the second third; posterior wings with two middle cells; the lanceolate cell much shorter than the submedian cell. Length, 10 mm.

Habitat, Olympia, Washington. 4 ♀♀, May 28, July 2. Trevor Kincaid, collector.

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Habitat, Canada.

Kincaidia, sp. nov.

Habitat, Olympia, Washington.

Pacifica, Prov.

1886. *Synairema*, Provancher, Faun. Ent. Can. Suppl., II., 15.

1887. *Synairema*, Cresson, Trans. Amer. Ent. Soc. Suppl., 169.

Habitat, Vancouver Island.

*The lanceolate cell is said to have an oblique cross-nervure, and *Synairema* to have this cell closed in the middle.

COLEOPTERA OF LAKE WORTH, FLORIDA.

BY ANNIE TRUMBULL SLOSSON, NEW YORK.

I was much interested in Dr. Hamilton's paper on Lake Worth Coleoptera (CAN. ENT., XXVI., 250). I spent twelve days at Palm Beach, Lake Worth, last spring, and did a little collecting. I took 57 species of Coleoptera between March 9th and 21st. Of these, 36 are not included in Dr. Hamilton's list. I append the names of these, and add a few notes. I am indebted to Mr. Chas. Lubeck for identifications.

Casnonia ludoviciana, Sallé.

Apenes sinuata, Say.

Chlænius niger, Rand.

Selenophorus palliatus, Fab.

" *iripennis*, Say.

" *gagatinus*, Dej.

Philhydrus nebulosus, Say.

" *cinctus*, Say.

Staphylinus tomentosus, Grav.

Olibrus princeps, Sz.

Languria marginipennis, Sz.

Cicones lineaticollis, Horn.

Psammæcus Desjardinsi, Guer.

Hister abbreviatus, Fab.

" *defectus*? Lec.

Cyphon padi, Linn.

Photuris frontalis, Lec.

Dinoderus porcatus, Lec.

Onthophagus hecate, Panz.

Aphodius vestiaria, Horn.

Criocephalus obsoletus, Rand.

Elaphidion truncatum, Hald.

" *parallelum*, Newm.

Leptostylus aculiferus, Say.

Lypsimena fuscata, Lec.

Spalacopsis suffusa, Newm.

Ædionychis thoracica, Fab.

Odontota bicolor, Oliv.

Coptocyclus aurichalcea, Fab.

Sitophagus pallidus, Say.

Blapstinus fortis, Lec.

" *estriatus*, Lec.

Alphitobius piceus, Oliv.

Pteniopus Murrayi, Lec.

Lixus lævicollis, Lec.

Cryptorhyncus bisignatus, Say.

I found but one specimen of *Casnonia ludoviciana*. It was in the sand at the roots of a species of *Crotalaria*, near ocean beach. *Selenophorus iripennis* was very common under boards and rubbish just back of the hotel. Several specimens of *Philhydrus nebulosus* flew into my room at night. *Staphylinus tomentosus* was found under decaying cabbage leaves in garden patches. What I now suppose to be the *Belonuchus formosus*, var. of Dr. Hamilton's list, was plentiful in situations similar to those he mentions, "under damp rubbish" and decaying vegetation. *Photuris frontalis* was the only "firefly" I saw, coming about piazza of hotel and into the rooms. On the white sand near ocean beach, in the sparse and scattered semi-tropical vegetation, several species were constantly found in great profusion. Among these, *Blapstinus estriatus*, was perhaps the most common, and could be taken by hundreds. With it was always found a hemipter, *Corimelana*, sp. ; so like its coleopterous companion superficially, that I at first, in gathering them quickly into my bottle, did not detect the difference, but the characteristic odour soon betrayed them. In the same situations *Mecynotarsus elegans* occurred in great numbers. Dr. Hamilton's allusion to their presence on "sand, hot enough to blister," appeals to me forcibly. I never saw, or felt, anything so scorching. I also noticed the tiny ant found in their company, and so like them in general appearance and habit ; and wrote of it to Mr. Lubeck. He finds *Mecynotarsus candidus* on sandy places in New Jersey, but says nothing of any ant as associated with it. *Pteniopus Murrayi* flew to light in the evenings, and I took at least two or three every night. On the wall of my bedroom one evening, I captured two specimens of the little weevil, *Cryptorhyncus bisignatus*, and this summer I took the same species on the summit of Mt. Washington !

GENITALIC CLASSIFICATION.

BY REV. GEO. D. HULST, BROOKLYN, N. Y.

In the August number of the CANADIAN ENTOMOLOGIST, Vol. 26, p. 215, under the subject "An Omitted Phycitid," Mr. Grote speaks disparagingly of my having established a subfamily upon differences in genitalic structure, and says: "Messrs. Scudder and Burgess first gave us genitalic species; Lederer used the genitalia for subgeneric and generic divisions, and latterly is followed by Smith. Now comes Mr. Hulst, whose mission seems to be to carry out the methods of other entomologists to extremes, and give us genitalic subfamilies."

So far as the above touches upon science I wish to speak.

There are only two questions to answer in defense of the use of genitalic characters in classification: the one,—Is the method scientific? and the other,—Is it warranted in the case under discussion?

First,—Is it scientific? The structure of the genital organs belongs to those phases of structure ordinarily known as secondary sexual characters. These all stand in the same category in classification. If one can be used, another may be, and may be of equal value. But from the beginning systematists have made abundant use of such of these characters as were known to them, for not only subfamily, but even higher divisions. For example, in the paper of Mr. Grote, referred to above, he says: "In 1878 I separated the *Epipaschiina* (*Epipaschia*) from the *Phycitina* (*Phycidæ*). The two groups I regard as divisions of the *Pyalidæ*, equal in value to the *Crambinæ* and *Galleriinaæ*." These are one step higher than the division I made based upon the genitalia. But Mr. Grote's division was based upon a secondary sexual character, the presence of a peculiar development on the basal segment of the male antennæ. I conclude, therefore, it is scientific to make use of any secondary sexual character. The use of the structure of the genitalia in classification is therefore scientific. But to be of scientific importance, and properly used, structural characters must be so permanent that their variations can be relied upon. Is this true with the genitalia? It can, I think, be affirmed, that no other secondary sexual character can be so confidently relied upon. The universal testimony of those who have made a study of genital structure is entirely in accord with this truth. One can with more absolute certainty, where there is variation, tell an insect by the genital structure, than by any other—often all other means.

But, secondly,—Is the use of genital structure warranted in the case under discussion? Of course all distinctions in classification are to an extent artificial, and a matter of opinion; but we will probably all agree that for family or subfamily distinction there ought to be not a simple difference in structure, but in the *type* of structure. If there be a typical difference, the distinction may be made even though intergrades exist. For example, so far as the antennal process is concerned, the *Epipaschiina* grade insensibly into the *Phycitinae*. But, as the structure is very peculiar, they may properly be separated. In the *Phycitinae*, Mr. Ragonot bases a separation upon the tongue. His basis, however, is not one of type, but of degree, with all intergradations existing, and therefore should not be allowed for anything higher than genera. But the genital structure is of two radically different types, sharply distinct, and so far as I know (and I have examined almost every American species), without any tendency to intergrade; subfamily distinction is therefore fully warranted.

I do not stand alone in this my opinion. I think there will be no question there is no one living better able to give a judgment in the case, or more honest in his utterance of judgment at all times, than Prof. Fernald. In a notice of my monograph of the "*Phycitidae* of N. A.," CAN. ENT., Vol. 22, p. 191, Prof. Fernald says: "Mr. Hulst divides the family into two subfamilies, based on the presence or absence of the lower anal plate, and differs from Ragonot, who divides them on the development of the tongue; from my own studies I am inclined to agree with Mr. Hulst."

After writing the above, I wrote to Prof. Fernald, indirectly asking his present views upon this subject. His answer I have his permission to use as I please. I therefore quote a considerable part of it, which directly bears upon the subject before us, and which also gives a considerable amount of very interesting history upon the bringing into light of the structure of the genitalia as a prime factor in classification.

Prof. Fernald says in part: "In 1877 I began my studies of the *Tortricidae*, at the suggestion of Mr. Grote. In 1880 I read a paper before the Entomological Club, at the Boston meeting of the American Association for the Advancement of Science, in which I stated that I was able to separate the subfamilies of the *Tortricidae* by means of the genitalia. I had prepared and studied the genitalia of a large number of species, and also of individuals under the species. I showed at that meeting a large number of drawings made from the objects by means of

the camera. In these studies I found characters by means of which I could separate the species ; others which separate the genera ; and still others which separate the subfamilies, or families, as some call them. As the Club was not a part of the American Association, the paper was not published, nor has it ever been published, though many of our prominent entomologists were present and heard my paper."

" Mr. Meyrick, in his Descriptions of New Zealand Microlepidoptera, Phil. Inst. of Canterbury for 1884, p. 141, after giving a recasting of his definition of the *Tortricidæ* and *Grapholithidæ*, says: 'I am indebted to Professor Fernald, well known as a special authority on this group, for the information on which this change is founded. He states that the genital uncus never occurs in the *Grapholithidæ*, and considers that such genera as *Ctenopseustis*, hereafter described, should be therefore referred to the *Tortricidæ*; which amounts to saying, that the possession of the uncus is a more valuable systematic character than the possession of the basal pectination (of the median fold of the hind wing). As Professor Fernald has devoted much labour to the investigation of material from all parts of the world, there is little doubt that he is correct, and I have adopted his suggestion. I have not yet found leisure to examine the genitalia of all the *Tortricina* of this region, but I have investigated a few species, which appear to confirm his views ; and in the case of the *Pyralidina*, I have found the same character valuable for family separation.' " " In the same paper, page 146, Mr. Meyrick establishes the genus *Ctenopseustis* for Walker's *Padisca obliquana*, and under it says: 'Professor Fernald assures me that the genital uncus of the male (the value of which as a divisional character he was the first to discover in this group) is never developed in the *Grapholithidæ*, and that this species should be included in the *Tortricidæ*, notwithstanding the pectination of the lower median vein, this latter structure being indeed also found in *Oenectra*, which is certainly referable to the *Tortricidæ*. In this view I quite concur, and therefore place the species here, which involves the formation of a new genus for its reception.' "

" I write this to show why I could speak so confidently of the value of your classification of the Phycids."

It will thus be seen that my use of the genitalia in classification, while independent of, because I was ignorant of, the work of Prof. Fernald and Mr. Meyrick, was far from being original in time or in inception. Prof. Fernald was the pioneer in the work, and to him belongs the greater guilt,

if guilt there be, and the greater, if not all the praise, if praise be merited, as I most emphatically believe it is.

But in view of all that is above, it will, I think, appear that my distinction in the *Phycitidæ* is warranted. Genitalic differences may be used in classification, and when the type of structure is different, may be used for distinctions higher than genera, and finally, that no ordinary differences in elemental structure afford a better basis for classification.

This is all written upon the assumption that the form of the genital organs is a *secondary* sexual character. Some of our best systematists regard this structure as a *primary* sexual character. Prof. J. B. Smith is of this opinion, and his opinion is of the highest value. In that case the value of the structure of the genitalia in classification is much increased, and family distinction based upon it is the more fully warranted.

NOTES ON CARAMA AND OTHER MEGALOPYGIDÆ.

BY HARRISON G. DYAR, A. M., NEW YORK.

Recently, I was informed by a friend that he had a *Carama* from Washington, D. C. I naturally expected to see *C. cretata*, Grt.; but the specimen now before me proves to be *Carama pura*, Butl. This raises the question of the validity of the specific characters used in the genus. *Caramas* are rare in the United States, and it seems scarcely probable that we have more than one species. Mr. Baker, in his review of *Carama*, does not refer to *cretata*, Grt., though it is the fourth name in point of priority. It is evident from his synopsis, however, that *cretata* differs from *ovina*, Sepp., only in having the yellow colour confined to the vertex of the head, and from *discrepans*, Wall., in its smaller size and white front.

I am of the opinion that these characters are nothing but individual variations, and I think we shall be safe in adopting the following synonymy. Probably several other names must come in, but I will go no further at present than the specimens before me seem to warrant.

CARAMA OVINA, Sepp. (front pale.)

cretata, Grote.

var. VIRGO, Butl. (front dark.)

pura, Butl.

In the revision of North American "*Bombyces*," by Mr. Neumøgen and myself, we include the genera *Dalcerides* and *Eupoeya* among the

Megalopygidæ (*Lagoidæ*). We recognized that the former did not belong here ; but it seems nearer this family than any other, and was so placed, pending further study of the South American fauna, when it will probably find place in a new family.

As to *Eupoeya*, I am inclined to believe that it belongs to the *Megalopygidæ*, though the branching of the radial nervules of primaries is rather unlike the typical form, and Dr. Packard's figures do not show a branch to vein 1.

I find that *Sciathos punctigera*, Linn., belongs to the *Megalopygidæ* (Kirby's Cat., p. 540, next to Sibine in the *Limacodidæ*).

The genera so far shown to belong to this family separate as follows :—

Vein 7 arising nearer base than 9.....*Eupoeya*, Pack.

Vein 7 arising beyond 9.

Vein 10 from a stalk.

Veins 3-4 of secondaries stalked.....*Carama*, Walk.

Veins 3-4 of secondaries not stalked.

Vein 8 of secondaries united to 7 to outer third of cell.....*Ochrosoma*, H. S.

Vein 8 united to 7 nearly to tip of cell....*Sciathos*, Walk.

Vein 10 of primaries from the cell.....*Megalopyge*, Hübner.

Eutheca (*Sapinella*, Kirby) *mora*, Grote.

Lord Walsingham has kindly sent me the following information :—
“An examination [of the type in the British Museum] shows it to be an *Anaphorid* with 12 separate veins in the forewings and eight in the hindwings. I can scarcely distinguish it from *Pseudanaphora arcanella*, Clem., of which it may be the ♀, which is unknown so far as I am aware.” The name may be removed from the list of unidentified *Bombyces*, and the genera *Eutheca*, Grt., and *Sapinella*, Kirby, relegated to the synonymy.

CORRECTION.

In the list of Dragonflies of Corunna, Mich. (C. E. xxvi., p. 345, December, 1894), *Calopteryx apicalis*, Burm., should be *Calopteryx equabilis*, Say.
D. S. KELLICOTT.

ON A NEW SCALE-INSECT FOUND ON PLUM.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Some time ago, Prof. Gillette sent me a few specimens of an *Aspidiotus* found on plum at Cañon City, Colorado, 31st Aug., 1894. They occurred on the fruit itself. He had previously sent the species to Mr. L. O. Howard, who had written that it was apparently new. The material sent was not altogether satisfactory, owing to the fact that the insect occurs solitarily on the fruits, and has to be collected by slicing off bits of the skin. Consequently it is inconvenient to obtain it in quantity, and not very easy to nicely preserve those obtained. However, the discovery of a new *Aspidiotus* on plums in the United States was a matter of importance, and deserved the most careful consideration. It now appears, after some study and correspondence, that the species is really new, as at first supposed, and it may be introduced as follows:—

Aspidiotus Howardi, n. sp.

- ♀ scale circular, flat, about $1\frac{1}{2}$ mm. diam., pale greyish with a slight reddish tinge; exuviae sublateral, covered, dull orange, secretion over exuviae easily rubbed off.
- ♀ broadly pyriform, orange; margin of terminal portion thickened, very finely striate, showing a violet colour in some lights. Plates spine-like, sparingly branched. Median lobes very large and prominent, close together but not contiguous, obliquely truncate, slightly crenate. Second pair of lobes small, broad and low. Third pair practically obsolete. There are conspicuous "wax ducts."

This species belongs to a series with circular or nearly circular ♀ scales; and more elongated, somewhat oval ♂ scales. The covered exuviae are orange or reddish, and easily exposed by rubbing. The median lobes of the ♀ are large, the others comparatively small, or obsolete. Such species are *A. perniciosus*, Comst., *A. ancylus*, Putn., *A. punicea*, Ckll., *A. ostreaformis*, Curt.

In *perniciosus*, one does not find the same array of plates as in *Howardi*, and there are the characteristic "incisions" between the lobes. Moreover, *perniciosus* always lacks the grouped glands.

Turning now to *ancylus*, we find a species with grouped glands when mature, but presenting also the "incisions" as in *perniciosus*. It has not, either, the same arrangement of plates as *Howardi*. *A. juglans-regie* is clearly out of the question, by superficial appearance alone. The West

Indian *punica* differs clearly in the scale, and it will suffice to say, without further details, that *Howardi* is not identical with any known neotropical species.

Having thus satisfied ourselves that it is no known American species, nearctic or neotropical, we naturally turn to Europe. Is it *A. ostreaformis* of Curtis? I have examined *ostreaformis* from Isleworth, England, (Geo. Manville Fenn), on peach; also from Rouen, France (sent by Mr. Morgan). It is quite manifestly not *Howardi*, though in some respects like it; *ostreaformis* has the median lobes well notched without, the second lobes longer and narrower, a pair of curious tooth-like plates beyond, numerous orifices in the groups of ventral glands, etc. On the whole, *ostreaformis*, *perniciosus* and *ancylus* appear to be nearer to one another than either to *Howardi*.

Lichtenstein's *A. pyri* is presumably the *ostreaformis*, formerly confounded, as remarked, with a *Diaspis*. But he says the ♂ scale is rounded, whereas it is surely oval—at least in true *ostreaformis*, as in *Howardi*. As for other European species, I find none that will agree with our insect.

There is one other species of *Aspidiotus* that seemed very like ours, and that is *A. spinosus*, Comst., found on Camellias in the conservatory of the Dept. Agriculture at Washington, the original habitat being unknown. The food-plant suggests Japan, and when I noticed the resemblance to *Howardi* in this insect I was much interested, having already thought of the probability that our species came on Japanese fruit trees, the importation of which has lately become increasingly popular. Judging by Comstock's figure of *spinosus*, it might seem that they could not be the same; but the figure shows only one pair of lobes, the description giving second and third pairs, though stating that they are small.

At this point I should have been inclined to let the matter drop, or await further developments, but for the kindness of Messrs. Howard and Pergande, in Washington. Having put my difficulty to Mr. Howard, he turned the matter over to Mr. Pergande, who prepared the appended report. This report seems to indicate that Comstock's figure of *spinosus* is more correct than his description; but, in any case, it practically settles the difficulty as to the possible identity of *Howardi* with *spinosus*. I had not myself seen the grouped ventral glands in *Howardi*, but Mr. Pergande shows that they exist.

With regard to the name of the species, it is a pleasure to dedicate it to Mr. Howard, to whom we are so greatly indebted for information regarding parasites of Coccidæ.* The present species, *Howardi*, is infested by a dark brown Chalcidid parasite.

As to the origin of *A. Howardi*, nothing certain can yet be said, but it is still possible enough that it comes from Japan. At all events, horticulturists should be on the look-out for it, and some care should be exercised that it may not spread widely over the country. Attacking the fruit, it would surely interfere with their market value, even if not seriously injuring the tree.

Mr. Pergande, on A. Howardi and A. spinosus.

"Examined and compared typical specimens of *Asp. spinosus* with *Asp. Howardi*, with the following results:—There can be no doubt that the two are distinct species. *A. Howardi* is considerably larger than *spinosus*; measuring 1 mm. in length [= adult ♀], whereas the largest one of *spinosus* is but 0.6 mm. in length.

"The anal segment of *A. spinosus* presents the following characters:—There is but *one pair of anal lobes visible*. The spines on either side of these lobes are numerous, more or less distinctly toothed, grouped closely together and occupying the terminal third of the segment. [These spines are the spine-like plates.]

"There are but 4 groups of spinnerets, of which the anterior pair of groups is composed of 2 to 5, and the posterior pair of 2 to 4 pores. *There appears to be but one row of more or less irregularly arranged, often quite indistinct, oval pores* between the groups of spinnerets and the lateral margin.

"In *Asp. Howardi*, of which I had but a single specimen for examination, there are *two pairs of well-developed terminal lobes*; while the spines are longer and stouter than in *A. spinosus*, they are also more scattered and cover about the posterior half of the segment. There are also but 4 groups of spinnerets, the anterior pair of which is composed of from 6 to 7, and the posterior pair from 3 to 4 pores. *The oval pores are large and distinct, forming two rows*, besides a few near the anterior end of the lateral margin.

*The North American Hymenopterous parasites of Coccidæ have been described as follows:—By Howard, 44; by Ashmead, 7; by Riley, 2; by Fitch, Le Baron, Emily A. Smith, Walker, Craw and Cook, 1 each; total, 59 species. There are a few others erroneously recorded as Coccid parasites, or only doubtfully parasitic on Coccidæ.

"Of *A. spinosus*, I examined 16 specimens, all of which agree with each other in every particular, while *A. Howardi* shows distinct and marked differences." (Oct. 29, 1894.)

It will be seen from the above, that the credit of differentiating this new species is very largely due to Mr. Pergande. Although this beginning of our information concerning it is very inadequate, there will, I trust, be no further difficulty about its separation from its congeners, thanks to Mr. Pergande's excellent comparative studies. It is apparent from this and other similar instances, how great is the advantage of having the types preserved in some place where reference can be made to them. Descriptions are often imperfect, and even those by the best authors frequently omit some characters differentiating the species from others not at that time discovered.

[P. S.—I have just received the following information from Prof. Gillette regarding the occurrence of *Aspidiotus Howardi*:—"A very few scattering scales were found in one orchard at Cañon City—the owner of the orchard I do not know—and the others were all found on the fruit of a native plum tree. The tree was in the back door-yard of a Mr. Helm, and growing beside a tight board fence. Most of the scales were on plums next the fence and near the ground in the shade. Most of the fruits in that position had from one to three or four scales."—T. D. A. C.]

PRELIMINARY STUDIES IN SIPHONAPTERA.—I.

BY CARL P. BAKER, FORT COLLINS, COLO.

The following will form the first of a series of papers on the Siphonaptera, in which will be mentioned all known species, together with such new species as have come to my notice. Besides what has been drawn from the examination of a large series of specimens in my own collection, and many kindly sent me by Taschenberg, Howard, Bruner, Osborn, Comstock and others, I have borrowed freely from previous papers on the subject, and especially from Taschenberg's "Die Flohe."

The existing number of species of this order will undoubtedly be found to very greatly exceed the number already known. A large proportion of mammalian animals probably act as hosts to various species of fleas, but the list of hosts as at present known is comparatively very small indeed. The group, though certainly an interesting one, has been very much neglected. I would suggest that during the immediate future, collectors in all quarters pay particular attention to the collecting of these forms.

Order *Siphonaptera*, Latr.*

1798. Schellenberg, Helvetische Entom. I., p. 15. (Rophoteira.)
 1801. Lamarck, Syst. d. Anim. s. Vert., p. 313 (Aptera.)
 1805. Latreille, Hist. nat. des Crust. et des Insect. XIV. (Suctoria.)
 1825. Latreille, Fam. nat. du Regne Animal. (Siphonaptera.)
 1826. Kirby and Spence, Introd. to Entom. IV. (Aphaniptera.)
 1829. Stephens, Cat. Brit. Insect. (Pulicidæ.)

Wings entirely absent; mouth parts suctorial; maxillary palpi four-jointed;† labrum and clypeus wanting; eyes, when present, two in number and simple; antennæ three-jointed; tarsi five-jointed. Metamorphosis complete, larva footless, with a well-developed head.

Table of Families.

- Small fleas with a proportionally very large head; thoracic rings very narrow; pregnant female a stationary parasite, with abdomen worm-like or spherical; labial palpi one-jointed; third joint of antennæ without transverse incisions; no "combs" of spines on head, thorax, or abdomen; eyes present; species tropical or subtropical. . . . *Sarcopsyllidæ*.
 Larger fleas with a proportionally small head; thoracic rings broad; head, pronotum, or abdomen often with "combs" of spines; antennal grooves sometimes covered on the outside by a chitinous scale; antennæ with terminal joint transversely creased, or cleft into lamellæ on one side; eyes sometimes absent; species widely distributed.
 Labial palpi with more than ten joints; abdomen in pregnant female becoming so swollen as to lose its original shape. . . . *Vermipsyllidæ*.
 Labial palpi three to five-jointed; never a stationary parasite, and never with the abdomen so swollen that the original form is lost. . . *Pulicidæ*.

Fam. *Sarcopsyllidæ*, Tschb.

1880. Taschenberg, Die Flöhe, p. 43.

Table of Genera.

Head angulated above in front; maxillæ very small, scarcely projecting; abdomen of pregnant female spherical with sutures obsolete. *Sarcopsylla*.

* Rophoteira, in part; aptera, in part; suctoria, pre-occupied.

† Packard, in a late paper (Proc. Bost. Soc. Nat. Hist., XXVI., Sept., 1894, pp. 312-355), follows some of the old authors in calling the maxillary palpi five-jointed (l. c. p. 348). I cannot see the reason for reiterating statements that have been proven incorrect. In the near future, I will review those portions of this paper which seem to be original.

Head evenly rounded from occiput to mouth ; maxillæ large, curved, projecting downward and backward ; abdomen of pregnant female worm-like, sutures distinct..... *Rhynchopsylla*.

Genus *Sarcopsylla*, Westwood.

1836-40. Westwood, Trans. Ent. Soc., London, II., p. 199.

Table of Species.

Hind angles of metathoracic scales rounded ; eyes and antennæ in anterior half of head, which is acutely angled in front above ; first four tarsal joints in foreleg longer than broad ; length (free female, and male), 1 mm. ; parasitic on mammals..... *penetrans*.

Hind angles of metathoracic scales angulated ; eyes and antennæ in posterior half of head, which is obtusely angled in front above ; first four tarsal joints in forelegs nearly as broad as long ; length, 1-1.5 mm. ; parasitic on gallinaceous birds..... *gallinacea*.

Sarcopsylla penetrans, L.

1767. Linne, Syst. Nat. Ed., XII., p. 1021. (*Pulex penetrans*.)

This flea is undoubtedly found throughout the tropical and sub-tropical regions of both hemispheres. It has been found on a great variety of mammalian animals, including man. It is commonly known in this country and South America as "jigger flea," "chigoe," or "chique."

Sarcopsylla gallinacea, Westwood.

1874-5. Westwood, Ent. Mo. Mag., XI., p. 246.

This species will probably eventually be found to occur throughout the range of *S. penetrans*. I have received specimens taken on chickens (through Mr. L. O. Howard) from the Department collection, as follows:—From Florida, Apr. 27, No. 6220, A. S. Packard ; from Floresville, Texas, No. 3648 ; from Hockley, Texas, Jan. 30, 1894, No. 3648 ; from Meridian, Miss., No. 4053.

The genital organs in the male of this species differ quite widely from those of the male of *S. penetrans*.

Sarcopsylla grossiventris, Weyenberg.

1879 Weyenberg, Boletín de la Acad. Nat. de Ciencias d. 1.

Repub. Argent., III., p. 188. (*Pulex grossiventris*.)

This is a *Sarcopsylla* and a good species, but was insufficiently described. The very large size (length of male, 2.5-3.25 mm.; of pregnant

female, 6-6.5 mm.) and the small metathoracic scale would separate it from *S. penetrans*. It was found on *Dasytus minutus*, Desm., and is probably restricted in range to southern South America, as nothing of the sort seems to have come to the notice of Bonnet.

Genus *Rhynchopsylla*, Haller.

1860. v. Frauenfeld, Sitzungsber. D. K. Akad. d. Wiss. Wien., XL., p. 462. (Hectopsylla.)

1880. Haller, Archiv. f. Naturgeschichte Jahrg. 46., p. 72. Taf. IV. (Rhynchopsylla.)

This genus contains but one species,

Rhynchopsylla pulex, Haller.

1860. v. Frauenfeld, Sitzungsber. D. K. Akad. d. Wiss., Wien., XL., p. 462. (Hectopsylla psittaci.)

1880. Haller, Archiv. f. Naturgeschichte Jahrg. 46., p. 72. Taf. IV. (Rhynchopsylla pulex.)

First mentioned by Frauenfeld, as taken from a species of *Psittacus*. Later was also found on a *Molossus*, sp.

Fam. *Vermipsyllidæ*, Wagner.

1889. Wagner, Horæ Soc. Ent. Ross. T., XXIII., No. 1-2, p. 205.

The family contains but one genus,

Genus *Vermipsylla*, Schimkewitsch.

1885. Schimkewitsch, Zool. Anz., No. 187.

Wagner (l. c.) characterizes this genus as follows:—Terminal antennal joint with nine circular incisions; mandibles double the length of maxillary palpi; labial palpi with 11 to 13 pseudo-joints; pregnant female with swollen abdomen. Parasitic on Ungulates.

Vermipsylla alacurt, Schimk.

1885. Schimkewitsch, Zool. Anz., No. 187. (Female.)

1889. Wagner, Horæ Soc. Ent. Ross. T., XXIII., No. 1-2, p. 205. (Male.)

(To be continued.)

BOOK NOTICE.

“Kritisches Verzeichniss der Myrmekophilen und Termitophilen Arthropoden mit Angabe der Lebensweise und mit Beschreibung neuer Arten. Von E. Wasmann, S. J., Berlin, Felix L. Dames, 1894.”

Under the above title, Dr. Wasmann has given us the greatest contribution to this interesting subject ever made, and one that must become a classic in Entomology. The work is published in the form of an octavo brochure of some 248 pages, and is gotten up in a fine style of the printer's art.

A few pages of introduction preface the main body of the work, giving a short history of the study of myrmecophiles and termitophiles, and stating the difficulties arising in the study of the matter and lying in the way of the preparation of such a Catalogue as the present. The number of accidental or transient visitors to the nests of ants and termites is very large, and has formed a considerable proportion of several previous lists, but the Doctor has eliminated this element from his paper so far as possible. This introduction is followed by a tabular statement of the number of myrmecophilous and termitophilous arthropoda mentioned in the body of the work, from which we make the following extracts:—

The entire number of myrmecophilous insects reaches 1,177 species, of which 993 are Coleoptera, under which the family Staphylinidæ is best represented with 263 species; the Paussidæ (none of which are North American) follow next with 169, then the Histeridæ with 128, the Pselaphidæ (s.s.) with 113, and the Clavigeridæ with 89. Several others hold from 15 to 40 species each of myrmecophilous habit, and in all 30 families are enumerated in this order. The Paussidæ and Clavigeridæ are, so far as known, almost exclusively myrmecophilous.

The Strepsiptera are represented by a single species of myrmecolax (*M. nietneri*, Westw.), which occurs in the hind body of ants in Ceylon. The Hymenoptera are found in 39 cases, of which 22 are other ants, and 14 belong to the parasitic families Braconidæ, Chalcididæ and Proctotruipidæ. There are 26 species of Lepidoptera, 18 Diptera, 7 Orthoptera, 1 Pseudoneuropter, 72 Rhynchota and 20 Thysanura. The Myriapoda are doubtful or more likely inimical and accidental. There are also 26 myrmecophilous spiders, 34 Acarina and 9 Isopodous Crustacea.

So much for myrmecophiles. The termites do not support such a large list of species, as 105 kinds of insects only are here recognized as

termitophilous. Of these, 87 are Coleoptera, distributed by families as follows:—Carabidæ, 5; Staphylinidæ, 59; Pselaphidæ, 5; Silphidæ, 1; Lathridiidæ, 1; Histeridæ, 7; Scarabæidæ, 6. The other orders of insects are not so well represented as the beetles, numbering thus:—Hymenoptera, 6; Lepidoptera, 2; Diptera, 2 (doubtful); Pseudoneuroptera, 4; Rhynchota, 3; Thysanura, 1. The Arachnoidea are present with 4 species.

After this presentation of the standing of different groups comes a bibliography of over 550 titles of books and papers containing more or less extensive notices of the inhabitants of ants' and termites' nests, and this is again succeeded by a list of species classified on a double system. Each family is taken up in order, and the species contained in it are arranged under different heads, as myrmecophilous or termitophilous. When the name of the host is known it is given, together with a reference to the source of information, and the author has inserted notes wherever they seemed necessary for the elucidation of difficult or disputed points. The list occupies nearly 150 pages, and is a marvel of careful study and long research.

Next in order is a supplement of 19 pages, containing descriptions of new species of these interesting little insects—among them several from the collections of Messrs. Schwarz and Pergande, who have done so much to advance our knowledge of North American forms. The work is closed by an alphabetical index, which admits of instant reference to any family or genus mentioned in the body of the book.

In conclusion, we must offer to Dr. Wasmann our sincere thanks and hearty congratulations on the completion of this comprehensive and valuable contribution to entomological literature. H. F. W.

DILIGENCE REWARDED.

Ever since Mr. Elliott disclosed the fact that *Platysamia Columbia* was to be found in this locality, a sharp lookout has been kept by the collectors here on the Tamarack trees, of which there are several clusters in this vicinity, for cocoons of that moth.

In the early part of December, 1894, Messrs. Balkwill and Rennie made the much looked for discovery, and in a short time had secured twelve, and on their next visit to the same locality, nine more; whilst they saw several that were well out of reach. They report them to be generally situated high up in the trees. On the smaller trees they are attached upright to the trunk, whilst on the larger ones, some were found on the branches, and seldom more than one on a tree. This is a good illustration of the advantage derived from knowing what to look for, and where to look for it, as they are far from being conspicuous objects.

J. ALSTON MOFFAT, London, Ont.

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No. 2.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

VII. THE CUCUJIDÆ OF ONTARIO AND QUEBEC.

The Cucujidæ constitute a small family of beetles of depressed, often elongate form, the antennæ lengthened in many species, giving them a somewhat characteristic appearance, which, while recalling the Cerambycidæ, renders them, nevertheless, easily recognized. They may be technically distinguished from the allied Clavicorn families by the long elytra, the five-jointed tarsi (the hind ones sometimes only four-jointed in the males), the rounded or oval anterior coxæ, the middle ones with externally open cavities and the posterior separate. The ventral segments are sub-equal in length. The larvæ, so far as known, are flattened grubs, with distinct antennæ and several ocelli; the terminal segments often with hooks or tubercles.

The table of genera, as given below, is entirely different from that used in the books, and is based on characters that can be easily seen by any one with the aid of a hand lens, but of course fails to express the real affinities, being made solely for the purpose of facilitating the work of identification of unknown species. Of the four figures given, three are taken from Captain Casey's "Revision of the N. Am. Cucujidæ," while that of *Cucujus clavipes* is original. The above-mentioned paper has proved very useful in the specific separation, and should be consulted by those who have to deal with extra-limital forms.

Seventeen species are recorded in the Canadian lists; they belong to eight genera, which separate thus:—

A. Antennæ with distinct club; third joint never longer, usually shorter than the second.

Club of three rather suddenly enlarged joints...*Silvanus*.

Club of gradual formation*Nausibius*.

- AA. Antennæ usually without club; third joint (with one exception) longer than the second.
- b. Head widest behind the eyes; colour, bright red ... *Cucujus*.
 - bb. Head widest across the eyes.
 - c. Antennæ shorter than head and thorax..... *Pediacus*.
 - cc. Antennæ longer than head and thorax.
 - f. Thorax distinctly serrate at sides..... *Brontes*.
 - ff. Thorax not serrate at sides, sometimes with a single tooth at anterior angles.
 - g. First antennal joint about as long as the head
..... *Dendrophagus*.
 - gg. First joint much shorter than head.
 - Thorax as long or longer than broad, size usually large *Catogenus*.
 - Thorax transverse, size small... *Læmophilæus*.

SILVANUS, Latr.

Small, usually elongate and somewhat depressed beetles of brownish or ferruginous colour, the elytra with large round punctures arranged in rows. Antennæ with the last three joints forming a rather abrupt and loose club. They are usually found in grain, which is often damaged considerably thereby, or under bark, more particularly that of oaks and poplars. The Canadian species may easily be known by the following characters: Fig. 1 represents *S. surinamensis*. Prothorax sub-oval, sides each with six large teeth (.10 in.)

..... *surinamensis*, L.
Prothorax elongate, strongly narrowed behind, sides not toothed.

Body very opaque. Thorax longer and with a sharp tooth at anterior angles (.11 in.)... *bidentatus*, Fabr.

Body somewhat shining. Thorax wider, teeth at angles less developed (.10-.11 in.)..... *planatus*, Lec.

Prothorax broader than long, anterior angles with a small tooth (.075 in.)..... *advena*, Waltl.



FIG. 1.

NAUSIBIUS, Redt.

One species (*N. dentatus*, Marsh.) is found here. It is larger than *Silvanus*, and the antennal club is of gradual formation. In

colour it is very dark brown, the body is densely and deeply punctured, and the sides of the prothorax are irregular, with six teeth. Length, .14 to .20 in.

CATOGENUS, Westw.

Represented by *C. rufus*, Fabr., a flat, chestnut-coloured insect, often taken under bark, and varying in size from a little over .15 to above .50 in. The prothorax is narrowed behind, distinctly punctured, but with a smooth median line. The elytra are deeply striate.

PEDIACUS, Shuck.

These are rather small, ferruginous or brownish insects of depressed form, broader than most Silvanini, which they resemble somewhat in the antennæ being terminated by a three-jointed club. They are thus differentiated:—

Surface opaque, lateral thoracic margin feebly undulated (.12-.16 in.)

..... *fuscus*, Er.

Surface somewhat shining, lateral thoracic margin feebly serrulate

(.12-.175 in.) *depressus*, Hbst.

CUCUJUS, Fabr.

A very striking insect on account of its colour is *C. clavipes*, Fabr. (Fig. 2.) The entire upper surface is scarlet, except the eyes and antennæ. The head is broad behind the eyes, the posterior angles being produced outward and backward, and rounded at tips. The thorax and elytra are very flat, the former having the disk impressed. Tibiæ and tarsi, dark. Length, .40 to .50 in. The form known as *puniceus*, Mann., is found in British Columbia, and may be known by the first antennal joint being usually testaceous instead of black, the more elongate body and narrower neck.



FIG. 2.

LÆMOPHLEUS, Lap.

Small, usually flattened, but sometimes moderately convex insects occurring commonly under bark. They are, as a rule, more flattened and often much broader proportionally than the Silvanini, the antennæ frequently elongate, especially in the males. The females, besides having shorter antennæ, have often a narrower head and thorax. The following table will enable the recorded species to be recognized:

- A. Elytra with a light spot before the middle of each.
 Elytral spot nearly circular, well defined, surface densely punctate (.10-.155 in.).....*biguttatus*, Say.
 Elytral spot ill-defined, irregular, surface lightly punctured (.10-.12 in.).....*fasciatus*, Melsh.
- AA. Elytra uniformly ferruginous or testaceous or slightly darker at tip, not spotted.
 Body flattened above.
 Second antennal joint shorter than third (.07-.09 in.).....*modestus*, Say.
 Second antennal joint equal to third (.05-.08 in.)..*testaceus*, Fabr.
- Body convex.
 Anterior thoracic angles toothed (.08-.10 in.)..*convexus*, Lec.
 Anterior angles rounded (.056-.08 in.).....*adustus*, Lec.

DENDROPHAGUS, Schönh.

D. glaber, Lec. (Fig. 3), is a shining, nearly black species (the elytra sometimes brown), varying from about .25 to .28 in. in length, of depressed elongate form, the head and thorax with deep coarse punctures, the wider elytra being punctate-striate. The antennæ are long, the first joint about equal in length to the head.



FIG. 3.

BRONTES, Fabr.

Body very flat, closely and coarsely punctured, antennæ nearly or quite as long as the entire body, the first joint about equal to the next three. The sides of the thorax are minutely serrate and sinuate. But one species (*B. dubius*, Fabr., Fig. 4) is actually recorded from Canada, but as another is probably common there, I give Capt. Casey's table for their distinction:—



FIG. 4.

- Elytra of male angulate posteriorly, head and thorax paler (.19-.23 in.).....*dubius*, Fabr.
 Elytra evenly rounded behind in both sexes, body above unicolorous (.19-.21 in.).....*debilis*, Lec.

The principal papers treating of the North American species of this small family are:—

1854. Leconte, J. L., Synopsis of the Cuculiides of the U. S. Proc. Acad. Nat. Sci., Phil., VII., p. 73-79.

1884. Casey, Thos. L., Revision of the Cucujidæ of America, north of Mexico. Trans. Am. Ent. Soc., XI., 1884, p. 69 to 112, pl. IV.-VIII.

SUMMARY OF THE U. S. PHASMIDÆ.

BY S. H. SCUDDER, CAMBRIDGE, MASS.

The following table, adapted from Brunner von Wattenwyl and Stal, will enable any one quickly to determine the genera in his collection of U. S. Phasmidæ. Our species are few in number and all apterous. Only one of them, *Diapheromera femorata* (Say), extends into Canada.

A¹. Tibiæ not furnished at apex beneath with a sunken areola to receive the base of the tarsi when bent upon them. (All of our genera of this division belong to the Bacunculidæ, in which the antennæ are much longer than the anterior femora and furnished with at least thirty joints, and the median segment is much shorter than the metanotum.)

b¹. Hind femora armed beneath on the median line near apex with one or more distinct spines.....*Diapheromera*.

b². Hind femora unarmed beneath next apex.

c¹. Head, especially in the ♀, furnished in front between the eyes with a pair of tubercles or longitudinal rugæ, sometimes highly developed; hind femora of ♀ hardly extending beyond the middle of the fourth abdominal segment, relatively stout; first joint of hind tarsi of ♀ shorter than the other joints together.....*Sermyle*.

c². Head unarmed in both sexes; hind femora of ♀ reaching the end of the fourth abdominal segment, relatively slender; first joint of hind tarsi of ♀ about equal to the other joints together.....*Bacunculus*.

A². Tibiæ furnished at apex beneath with a sunken areola to receive the base of the tarsi when bent upon them.

b¹. Antennæ many jointed, longer than the fore femora; median segment shorter than the metanotum; without spines on head, thorax or legs; anterior segments of abdomen transverse, at least in the ♀.

c¹. Mesothorax twice as long as the prothorax ; basal joint of antennæ but little longer and little stouter than the second *Anisomorpha*.

c². Mesothorax no longer than prothorax ; basal joint of antennæ fully twice as long and, especially on apical half, twice as stout as the second joint..... *Timema*.

b³. Antennæ with less than twenty joints, shorter than the fore femora ; anterior segments of abdomen much longer than broad *Bacillus*.

BACUNCULIDÆ.

Diapheromera, Gray.—The described species are *D. denticrus*, Stal, a large species found in the south-west (Louisiana and Texas); *D. femorata* (Say), of which *D. Sayi*, Gray, is a synonym, the commonest species and of the widest range, and *D. velii* Walsh, described from Nebraska. Apparently other species occur, but they have not been studied.

Sermyle Stal.—A species occurs in Texas, perhaps undescribed.

Bacunculus Burm.—Two species are found, one in Central Texas, the other in Southern Florida. Both are believed to be undescribed.

ANISOMORPHIDÆ.

Anisomorpha, Gray.—Three nominal species are known : *A. buprestoides* (Stoll'), *A. ferruginea* (Pal. de Beauv.) and *A. bivittata* (Say), all from the south-eastern and southern United States. Very likely there is only a single species (which must then take the name *buprestoides*), but *A. ferruginea* may be distinct from the others.

Timema (τίμημη) gen. nov.—This genus is closely allied to *Agathemera* Stal, but is readily distinguished by the somewhat remarkable antennæ, the first joint of which is very large, much enlarged apically, though narrowed a little at the extreme apex, several times longer than broad, and two or three times larger than the eyes. The head is of equal width with the prothorax, which is not narrowed anteriorly. A single species from Santa Cruz, California, has been brought to my notice by Prof. L. Bruner. I propose to describe it as *T. californicum*.

BACILLIDÆ.

Bacillus Latr.—Two species have been briefly noted : *B. coloradus* Scudd., found in Colorado, and *B. carinatus*, Scudd., occurring in Arizona and northern Mexico.

ALYPPIA MARIPOSA, LARVA.

BY HARRISON G. DYAR, NEW YORK.

Mr. J. B. Lambert has kindly sent me some alcoholic larvæ of *A. mariposa*, and I may record a few points in comparison with the eastern *A. octomaculata*. Mr. Lambert has given the life history quite fully in the December number of the CANADIAN ENTOMOLOGIST, but our species have not been compared. The larva is especially interesting, as being the second one discovered in this genus. We have long been familiar with that of *A. octomaculata*, and everybody has described it; but the other species, though somewhat numerous, have remained unknown.

Mr. Lambert has sent me specimens which appear to be in stages II., III., IV. and VI. The larvæ are noctuiform as is *octomaculata* with joint 12 enlarged. The tubercles are of the normal noctuid arrangement,* large, low-conical, rather less developed than in *octomaculata*, with single, large, smooth setæ. The width of head by calculation would be for the six stages—0.32, 0.50, 0.77, 1.2, 1.8, 2.8 mm. (ratio, 0.65). The measurements of the examples before me are 0.5, 0.75, 1.2 and 2.8 mm.

As compared with *octomaculata*, the markings are more generalized. Until the last stage, the larva is very plainly marked; besides the black tubercles, there is only present a diffuse white dorsal and stigmatal band, gradually becoming more distinct. In the last stage there are added four transverse black bands on each segment, instead of the eight of *octomaculata*, and these bands are confined to the space between the dorsal and stigmatal lines, and the two central ones on each segment are fused together. The abdominal leg plates are pale, instead of black, as in *octomaculata*. The ground colour is duller than in the eastern species. Instead of the bluish-white ground with the transverse orange bands on joints 5, 6, 7, and 12 of *octomaculata*, the whole ground is dull orange, relieved only by

* I., anterior subdorsal; II., posterior, more nearly lateral; III., lateral above spiracle; IV., stigmatal posterior; V., anterior, and VI., posterior inferior sub-ventral; VII., three setæ in a triangle on leg plate; VIII., near medio-ventral line.

See article by Wilhelm Müller in Zool. Jahrbücher for 1886, on larvæ of South American Nymphalidæ. Tubercles VI. to VIII. do not appear characteristically on these specialized butterflies, and are not described by Müller.

the diffuse white longitudinal bands, which become obsolete anteriorly. The stigmal band extends down below the spiracles and contrasts the black subventral tubercles. Its central part represents the inter-segmental, sub-stigmal white patches of *octomaculata*, though the marking is here quite undefined. Posteriorly the white bands tend to usurp the whole ground area, showing the origin of the white ground in *octomaculata*.

Nearly two years ago, Mr. Lember sent me an egg of *A. mariposa* (or possibly *A. Ridingsii*). The following is its appearance under the microscope:—Flattened, round, strongly depressed centrally at the micropyle. Rather less than forty deep grooves run vertically, a few not reaching the summit; the edges of these grooves are somewhat sinuate, as if formed of rows of large pits which had become confluent in a vertical direction. In a rather large area around the micropyle, the grooves cease and are replaced by closely crowded punctures, but not small, with sharply elevated rims. Diameter, .7 mm. Height about .2 mm. Base flattened.

ACTIAS LUNA.

On 24th May Mr. Lachlan Gibb took a female, which he left alive to get eggs, a number of which were laid between the 25th and 29th. On the 14th June the eggs were hatching, and the larvæ were offered butternut leaves, which they eat readily, and matured very rapidly. About the 27th of the month, Mr. Gibb kindly gave me four of these larvæ, which were then apparently more than half grown. They moulted once only, so far as my observations went, after I received them, and on 12th July three spun their cocoons, the fourth doing this on the 16th. Early in August Mr. Gibb asked me to take charge of his cocoons, and keep them with mine, as giving a better opportunity of getting another lot of eggs next season, and on 20th August I was surprised to find that one of Mr. Gibb's cocoons had disclosed the imago, a ♀. Thinking that this was only the forerunner of others, I kept it alive, taking all the cocoons down with me to Murray Bay, but no other emergence took place.

Mr. Street, jr., of this city, has since informed me that he saw a specimen on our mountain at about the same time as this one emerged.

H. H. LYMAN, Montreal.

CANADIAN COCCIDÆ.

I. THE SPECIES OF CHIONASPIS WHICH INFEST TREES OF THE TRIBE BETULÆ.

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEXICO.

In 1869 Signoret described a species from Switzerland as *Chionaspis alni*. It was found on the bark of the alder (*Alnus communis*). This species has never been seen in America, but in 1883 Comstock announced a form from alder and *Viburnum* as *Chionaspis Lintneri*. Since the latter date our knowledge of the matter seems to have remained without additions. Mr. James Fletcher has just sent me a *Chionaspis* plentifully infesting the bark of *Betula papyrifera*, from Charlottetown, Prince Edward Island, about 46° N. Lat. I examined this with interest, owing to the locality and the host plant, and on comparing it with Comstock's account of *C. Lintneri*, I have no doubt that it is the same.

The following description was made from the Charlottetown specimens :—

♀ scale white, with the exuviae rather small, orange-brown. Scale very broadly pyriform in outline, some nearly circular without the projection on which are the exuviae. Length of scale about 2 mm.

♀ (soaked, not boiled, in liquor potassæ) pale lemon-yellow. Mouth parts large. Ventral grouped glands well-developed, caudolaterals 31, cephalolaterals 38, median group with 18 orifices. A group of nine to fifteen oval dorsal pores situated nearly opposite the lateral groups of ventral glands. Bands of dorsal oval gland-orifices very distinct. The usual sac-like bodies between the lobes. Anal orifice between the cephalolateral groups of glands.

Median lobes large, rounded at their ends, but not truncate; their two sides, if continued to a point, would meet at a little less than a right angle. Lobes touching at base, thence widely diverging at about a right angle; not distinctly notched.

Second lobes shorter, rounded, with a small appendage or lobule placed cephalad.

Third lobes rounded, low, forming less than a hemisphere, with a small lobule placed caudad.

Margin beyond the lobes irregularly crenate, slightly serrate.

Spine-like plates as in allied species, two between first and second

lobes, three between second and third, next a large pair, then another larger pair, and then a group of five to nine. These characters are quite variable.

Comparing the above with Comstock's account of *Lintneri*, one or two points call for notice. Comstock says he found the ♀ reddish-brown, with the last segment yellow, but supposes in life it would be reddish. This I doubt, but my specimens are not alive, so I cannot say certainly what colour they originally were. In his table of *Chionaspis* (2nd Cornell Rep., p. 98) he separates *Lintneri* from *salicis* by two characters:—

- (1.) *Distal ends of mesal lobes pointed or obscurely trilobed.*

They are not exactly pointed, and the trilobation is very obscure, but the distinction intended seems a valid one.

In *salicis* these lobes are more truncate altogether.

- (2.) *A single plate laterad of each second lobe, and usually two plates laterad of each third lobe.*

This appears to break down altogether; the first specimen I examined was as above described, with two and three plates; but the character was not constant, the next one looked at being as typical *Lintneri*.

On comparing the Charlottetown scales with scales of *C. salicis* received from Mr. Newstead, I found that they were practically alike. Comstock says he cannot tell the scales of *Lintneri* (♀) from *salicis*,—neither can I.

If Comstock had not described *Lintneri*, I think I should have placed the Charlottetown insect, for the present, as *C. salicis*, var.; but although it is extremely near to *salicis*, it must be admitted that it is not really the same, and the name *C. Lintneri* stands valid.

Fortunately I had some scales of *C. alni*, Sign., sent to me by Mr. K. Sulc, collected at Kralové Dvur, Bohemia. On comparing them with the Charlottetown *Lintneri*, they were manifestly distinct, being narrower, not so white, with paler exuviae. They were from *Alnus glutinosa*.

It may not be out of place here to call attention to *Aspidiotus betulae*, Baren sp., 1849, which is listed in Prof. Smith's New Jersey Catalogue. It is a pretty and distinct species, but I have seen only European specimens.

II. PRELIMINARY NOTE ON THE SPECIES OF *LECANIUM* FOUND ON OAK IN NORTH AMERICA, WITH ESPECIAL REFERENCE TO ONE ON *QUERCUS RUBRA*.

Some time ago Mr. James Fletcher sent me specimens of a *Lecanium* found at Jubilee Point, Rice Lake, Canada, on *Quercus rubra*. This was handed to Mr. J. Bennett for examination, and was found by him to present the following characters:—

Scale, 4 mm. long, $2\frac{1}{2}$ wide, 2 high. Antennæ 7-jointed, formula 3 (2 1) 7 5 4 6. 7 was almost as long as 2. Tarsus, $\frac{2}{3}$ length of tibia; claw short and not very sharp.

There are four species of *Lecanium* known from oaks in North America, the characters of which, according to Signoret, are as follows (excluding non-essential details):—

L. antennatum, Sign. — Scale, 5 mm. long, $3\frac{1}{2}$ wide, 3 high. Antennæ 7-jointed, 3 very long, 7 longer than 4, 5 or 6, which are short. Tarsus a little longer than tibia, claw stout. Distinguished from *quercitronis* by its more elongate form.

L. quercitronis, Fitch.—Scale, 3 to 5 mm. long; 3 to 4 wide, hemispherical, somewhat elongate in lateral profile. Antennæ 7-jointed, 3 and 4 longest, nearly equal, 5 and 6 shortest, 7 as long as 4. Tibia longer than tarsus; claw very small. On black oak.

L. quercifex, Fitch.—Scale, 7 mm. long, 4 wide, 4 high. Antennæ 7-jointed, 3 and 4 equal, 5 and 6 equal and shortest, 7 as long as 5 + 6. Tarsus as long as tibia. On white oak.

L. quercus (Linné?), Sign.—Scale, 7 mm. long, $3\frac{1}{2}$ wide, $3\frac{1}{2}$ high. Antennæ not seen by Signoret. Tarsus not quite so long as tibia. More rugose than *quercifex*, but less so than *antennatum*. This can hardly be the true Linnean insect.

In Europe are found on oaks:

L. emerici, Planch.—On the "evergreen oaks" in South Europe.

L. fuscum, Gmel.—On *Quercus robur*; scale, 6 mm. diam.; antennæ 6-jointed, 3 much longer than 4. See Douglas, Ent. Mo. Mag., Oct., 1887, p. 98.

L. ciliatum, Dougl.—In England. See Ent. Mo. Mag., 1891, p. 67.

? *L. quercus*, Linn.—On *Quercus robur*. See Douglas, Ent. Mo. Mag., Oct., 1887, p. 99. These four names appear to represent only three recognizable species.

Putting aside the European forms, which do not appear to occur in America, we have two elongate species and two short ones. Our scale on *Q. rubra* evidently belongs with the latter. The main distinction between *antennatum* and *quercitronis* is in the antennæ, and here we see at once that our form falls in with the former, having the third joint very much longer than 4. There would seem, however, to be a slight difference in the legs.

On the whole, the evidence so far obtained cannot be said to support the view that the Canadian insect is new, and distinct from *antennatum*, though it may stand as a variety. For the present it can be recorded as *Lecanium antennatum*, Signoret, variety.

PROTECTIVE MIMICRY IN SPIDERS.

BY F. M. WEBSTER, WOOSTER, O.

In the concluding volume of his admirable work on "American Spiders and their Spinning Work," page 47, Dr. McCook gives the experiences of Mr. H. O. Forbes, and myself, with two species of spiders, whose forms and habits of spinning webs on leaves, together with the peculiar coloration of their bodies, gives them a deceptive resemblance to the droppings of birds. Dr. McCook tries to account for the phenomena of this protective resemblance, by attributing it to the results of natural selection.

Now, it seems to me that natural selection, alone, would not have carried the deception so far as seems to have been done in these cases, and I think, away from their curiously arranged web, these spiders are not so deceptive in appearance, and that the spider has itself learned that by remaining in a rigid position on a sheet of web, arranged in a certain way on the leaf, it will be enabled to escape its enemies, and, what may be of almost as much importance, secure a better supply of food.

To suppose this is hardly over-estimating the intelligence of these spiders. In my own case, I have thought that the deception might have been due, in part at least, to myself, and have often thought that on meeting with it a second time I should recognize it without much trouble.

The Doctor has apparently overlooked the fact that Mr. Forbes

met with his spider a second time, and was even more badly fooled by it than before. In Proc. Zool. Soc., 1883, p. 586, he gives his experience as follows:—

“On June 25th, 1881, in the forest near the village of Lempar, on the banks of the Moesi River, in Sumatra, while my “boys” were procuring for me some botanical specimens from a high tree, I was rather dreamily looking on the shrubs before me, when I became conscious of my eyes resting on a bird-excreta-marked leaf. How strange, I thought, it is that I have never got another specimen of that curious spider I found in Java which simulated a patch just like this. I plucked the leaf by the petiole while so cogitating, and looked at it half listlessly for some moments, mentally remarking how closely that other spider had copied nature; when to my delighted surprise, I discovered I had actually secured a second specimen, but the imitation was so exquisite that I really did not perceive how matters stood for some moments. The spider never moved while I was plucking or twirling the leaf, and it was only when I placed the tip of my finger on it, that I observed that it was a spider, when it, without any displacement of itself, flashed its falces into my flesh.

“The first specimen I got was in West Java. While hunting one day for lepidoptera I observed a specimen of one of the Hesperidæ sitting, as is often a custom of theirs, on the excreta of a bird on a leaf; I crept near it, intending to examine what they find in what one is inclined to consider incongruous food for a butterfly. I approached nearer and nearer, and at last caught it between my fingers, when I found that it had, as I thought, become glued by its feet to the mass; but on pulling gently, the spider, to my amazement, disclosed itself by letting go its hold. Only then did I discover that I was not looking on a veritable bird's excreta.”

Since reading of Mr. Forbes's later experience I have given myself no mental promises as to how readily I should be able to recognize Madam *Misumena vatia* (?) when I next meet her unexpectedly. Unless greatly mistaken, I have beaten this same spider from branches of trees while collecting beetles, and experienced no difficulty in recognizing its nature as it dropped into an inverted umbrella, and am quite sure that, without the white web on the leaf, which resembles the white splashings of the semi-fluid excreta, it would be far less deceptive.

PREPTOS, TAMPHANA AND AROTROS — A REVIEW.

In the Proceedings of the Zoological Society of London for 1892, Mr. W. Schaus describes as new 180 species of "Bombycid" moths from Mexico and various parts of South America, with three "new genera." Of these, one is located in the Lasiocampidæ and two in the Bombycidæ. All these generic descriptions are utterly inadequate, and the question should be raised seriously whether names founded on such descriptions should be recognized. We are accustomed to believe that the classification of Herrich-Schaffer is still used by lepidopterists, at least in its fundamental features; but in these descriptions the word "vein" does not appear. The description of the Lasiocampid is the longest of the three, yet the author gives but eight characters by which to identify his genus. Five of these are common to nearly all the genera of the family; two others appear in several genera already well known, and the genus must be distinguished from the one hundred and forty odd genera of Lasiocampidæ already catalogued, by the female having an expanse of wing of 95 mm., and a short abdomen, "not extending beyond the secondaries!"

Surely it is time to call a halt. Some standard of generic description must be adopted, or else what is the use of multiplying so-called "descriptions" that do not describe. Better to save puzzling over meaningless sentences, and simply say:—"New genus; type in my collection."

It would seem that the least that could be expected of an author was to tell how the venation differed from the nearest ally of the "new genus," the same being already described. A full description of the venation, or a figure, would be preferable. Even a complete knowledge of the wing structure is not sufficient to place a genus; but it is among the essentials.

I think all who have had anything to do with generic characters (which, unfortunately, does not seem to be a majority of lepidopterists!) will agree with me that the practices to which I am referring are reprehensible, and deserving of a most vigorous protest.

HARRISON G. DYAR.

ON THE COLEOPTERA OF NEW MEXICO AND ARIZONA,
INCLUDING BIOLOGIC AND OTHER NOTES.

BY C. H. TYLER TOWNSEND, LAS CRUCES, N. MEX.

A paper giving biologic notes on some New Mexico Coleoptera was published in "Insect Life," Vol. V., p. 37-40; and a paper treating of the blister-beetles or meloids of New Mexico and Arizona, in "Psyche," 1894, p. 100-102. The species mentioned in the former are mostly incorporated in the present paper, those in the latter not at all. These three papers, therefore, will serve as a catalogue, or list with notes, of all the Coleoptera observed by the writer in New Mexico and Arizona, except a few, the names of which it has been impossible to get from those to whom they were sent for determination.

I will not attempt to point out here any peculiarities in the Coleopterous fauna of this region, but let the list speak for itself. The absence, scarcity, and abundance of certain families and groups are interesting, and characteristic as a rule, though I cannot say that the list represents the true proportions, as my collecting was far too meagre.

All the species were determined by Dr. Riley, with the exception of those marked *, which were determined by Mr. Liebeck.

Tetracha Carolina, L.—Las Cruces, N. M. August 21st to Sept. 10th; seven. Grant County, N. M. (W. J. Howard); one.

Cicindela obsoleta, Say.—Grant Co., N. M. (W. J. H.); one. It is 19 mm. long, brownish black, with four creamy markings on each elytron, the inner or fourth one small, resulting from the breaking of the median large one into two.

Cicindela prasina, Lec.—Grant Co., N. M. (W. J. H.); one. It is 17 mm. long, bright vivid green, with six spots on each elytron, the three principal markings each broken into two.

Cicindela longilabris, Say.—San Francisco Mountain, Arizona, July 15th; one. Much like a large specimen of *vulgaris*, but with elytral markings very delicate, indistinct. *

Cicindela pulchra, Say.—Navajo Springs, Arizona, July 24th; ten specimens. Grant County, N. M. (W. J. H.); two large specimens.

Cicindela punctulata, Fab.—Navajo Springs, Arizona, July 24th; one. Grant County, N. M. (W. J. H.); one.

Cicindela micans, Fab.—Las Cruces, N. Mex.; one. Zuni, N. M., July 29th; one. Grant Co., N. M. (W. J. H.); one. Green species.

Cicindela macra, Lec.—Las Cruces, N. M.; four.

Cicindela sperata, Lec.—Winslow, Arizona, July 19th; one. Aztec, Arizona, July 21st; two. Navajo Springs, Arizona, July 24th; five.

Cicindela, sp. indet.—Grand Canon, Arizona. Hance trail; 2,500 to 5,000 ft. below rim. July 8th to 11th; twenty-seven collected. *

Calosoma scrutator, Fab.—Las Cruces, N. M., May 17th, 1892; one. Palomos, N. M., June 15th, 1892; one seen to drop from a cottonwood tree, on which it had doubtless been hunting and devouring *Hemileuca* larvæ that were present on the tree. Another on a tree, and still another taken on ground at a spring. Grant County, N. Mex. (W. J. H.); one.

Calosoma peregrinator, Guér.—Grant County, N. M. (W. J. H.); one. Blackish.

Pasimachus obsoletus Lec.—Grant County, N. M. (W. J. H.); one.

Pterostichus scitulus, Lec.—Zuni, N. M., July 29th, 1892. A green species; one.

Harpalus caliginosus, Fab.—Grant Co., N. M. (W. J. H.); two.

Cymbiodyta fraterculus (? Lec.—? Ilybius).—Soledad Canon, Organ Mountains, N. M. In a north side branch, about two miles up. May 23rd, 1891; one. In same spring with following. A smaller black water-beetle.

Rhantus atricolor, Aubé.—Soledad Canon, Organ Mountains, N. M. Same north side branch, about two miles up. May 23rd, 1891. Numerous specimens (11) taken from a spring full of dead leaves.

Hydrophilus triangularis, Say.—Las Cruces, N. M.; one.

Hydrocharis glaucus, Lec.—Grand Canon, Arizona. Hance trail. July 8th, 1892; one. An oblong-hemispherical black water-beetle, taken in stream. *

Necrophorus guttula, Mots.—Johnson's Basin, Socorro Co., N. M.; one. June 23rd. Black and orange.

Megilla vittigera, Mann.—G. Bar Ranch, Zuni River, Arizona. July 27th, 1892; three. *

Hippodamia sinuata, Muls.—Colorado, N. M., June 14th, 1892 ; one.

Coccinella oculata, Fab., and var. *abdominalis*, Say.—Las Cruces, N. M. May 22nd, 1892. Many pupæ found on black locust at Central Hotel in Placita. On June 13th, 1892, both the species and the variety were found on mesquite (*P. juliflora*) on road between Detroit and Rincon, N. M., and a great many larvæ were also seen on the mesquite.

Mysia Hornii, Cr.—Turkey Tanks, Arizona, July 1st ; one.

Chilocorus, sp. ?—Las Cruces, N. M., July 16th, 1891. Found empty larval skins of a coccinellid on trunks of apple trees. They were in patches of as many as twenty in places, usually just beneath where a large limb branched out from the trunk.

Hyperaspidius trimaculatus, L.—Las Cruces, N. M.

Epilachna corrupta, Muls.—Las Cruces, N. M. Very injurious to beans. (See Insect Life, IV., 26.)

Erotylus Boisduvalii, Chev.—Grant County, N. M. (W. J. H.); one. This is a peculiar beetle, wholly black except the elytra, which are pale yellowish-white, with scattered, very small, shot-like black dots and a little black on outer edge in middle of each elytron.

Dermestes marmoratus, Say.—Chaves, N. M. Aug. 6th, 1892 ; one.

Attagenus Hornii, Jayne.—Las Cruces, N. M.; one beaten from mesquite (*P. juliflora*), May 12th, 1891. On mesa.

Trogoderma tarsale, Melsh.—Las Cruces, N. M. Found May 9th, in spring mattress of a bed, in some numbers. It was a hair mattress, and the beetles doubtless bred in it.

Anthrenus varius, F.—Las Cruces, N. M. One beaten from flowers of mesquite (*P. juliflora*), May 10th, 1891. On mesa.

Hololepta populnea, Lec.—Las Cruces, N. M., Nov. 14th, 1892. Found under bark of cottonwood log, in wet black inner layers of decaying bark, numbers of adults of this flattened histerid. They were infested with mites. Pupæ of this species were found under cottonwood bark, November 16th and 17th, 1892, in Alameda and *Bosque vedado*. They were enclosed each in a little cell in the inner layers of bark, the cell opening against the sap-wood. The cell is formed of pieces of the inner bark, and is placed between the inmost layers of bark and the sap-wood, being attached to the

former. The pupa is wide, flattened, tapering rather shortly behind, and is slightly hairy anteriorly, with a pair of short anal styles posteriorly. It was bred to the imago state.

Hister Ulkei, Horn.—Zuni, N. M., July 29th, 1892. A black and red histerid.

Paromalus estriatus, Lec.—Las Cruces, N. M., Nov. 14th, 1892. Found under bark of cottonwood; in the wet black inner layers.

Saprinus discoidalis, Lec.—Winslow, Arizona, June 29th, 1892. A greenish-black histerid.

Carpophilus hemipterus, Linn.—Las Cruces, N. M., April, 1892. Found in ensilage by Samuel Steel, in company with some staphylinids. The ensilage was stored the previous summer, and kept tight all winter, so that the beetles had no access except from the adjoining earth. It was covered several feet deep with earth.

Carpophilus pallipennis, Say.—Las Cruces, N. M., May 18th, 1892. Numerous specimens found in yellow flowers of an *Opuntia*, sp., on Tortuga Mt. A dark, reddish-brown species, with elytra yellowish, except at inner basis.

Hesperobæus, n. sp.—Soledad Canon, Organ Mts., N. M. Eating newly-forming flowers of *Dasyllirion Wheeleri*. (See Insect Life, V., 38, where it was referred to *Rhizophagus*.)

Sandalus porosus, Lec.—Zuni, N. M., July 31st, 1892; one.

Adelocera rorulenta, Lec.—Hart Little Spring, Arizona, July 4th, 1892; one. A most beautiful brown, bronze-yellow-dusted species.*

Chalcolepidius Webbii, Lec.—Grant County, N. M. (W. J. H.); two.

Alaus lusciosus, Hope.—Las Cruces, N. M., May 26th, 1892; one. Greatly resembles *oculatus*.

Melanotus, sp.—Grant County, N. M. (W. J. H.); one.

Gyascutus planicosta, Lec.—Grand Canon, Arizona. Hance trail. 3,000–4,000 feet below rim. July 10th, 1892; one. Also common at Las Cruces, N. M., on larrea and mesquite. (See Insect Life, V., 38.)*

Gyascutus carolinensis, Horn.—Grand Canon, Arizona. Hance trail. 3,000–4,000 feet below rim. July 11th, 1892. A bronzed species, but smaller than *planicosta*.*

Psiloptera Webbii, Lec.—Las Cruces, N. M., August 19th, 1892. Found six of this large purplish-blue metallic buprestid, with brassy yellow spots, on *Salix longifolia* in the Alameda. It seemed to be eating the leaves. On August 21st many more were found on the same *Salix* in other localities along the *Acequia madre*. One was found also Nov. 14th, 1892, on same *Salix* in Alameda. The beetle is common, but I have never found it on anything else except this *Salix*. Grant County, N. M. (W. J. H.); one.*

Buprestis Nuttalli, Kirby.—Grant County, N. M. (W. J. H.); one. This beautiful species is blackish, with a slight greenish lustre, elytra each with three yellow marks in a longitudinal line near centre, the two posterior ones on the right elytron coalescing by a narrow neck.

Buprestis maculiventris, Say.—Grant County, N. M. (W. J. H.); one. A blackish species.

Melanophila miranda, Lec.—Grant County, N. M. (W. J. H.); two. A beautiful black and yellow species.

Chrysobothris carinipennis, Lec.—Flagstaff, Arizona, July 3rd and 16th, 1892; two.

Chrysobothris debilis, Lec.—Las Cruces, N. M., May 13. A pair in coitu.*

Chrysobothris, n. sp.—Woodruff, Arizona, June 26th, 1892. A single specimen of a beautiful and most vivid metallic green species:

Thrincopyge alacris, Lec.—Las Cruces, N. M. Bred from dead flower-stalks of *Dasyllirion Wheeleri*. (See Insect Life, V., 38, where the species is queried.) June 1st, 1892. One more issued from the flower-stalks gathered May 18th, 1892. Another issued June 6th, 1892.

Thrincopyge ambiens, Lec.—Las Cruces, N. M. Bred from *Dasyllirion Wheeleri* flower-stalks of previous year. August 11th, 1892, after returning from a two-months' field trip, four of the beetles were found dead in the breeding cages. The species is about the size of *T. alacris*, but is deep metallic green with a yellowish border.*

Acmaeodera mima, Gory.—Soledad Canon, Organ Mts., N. M., May 23rd, 1891; one on thistle. Looks much like *A. pulchella*.

Acmaodera pulchella, Hbst.—Soledad Canon, Organ Mts., N. M., May 23rd, 1891; one on thistle flower. .

Acmaodera culta, Web.—Las Cruces, N. M., August 11th, 1892. A dead specimen found issued from dry flower stalks of *Dasylirion Wheeleri*. August 18th another had issued. *

Lygistopterus rubripennis, Lec.—Flagstaff, Arizona, July 2nd and 3rd, 1892; two.

Pyropyga fenestralis, Melsh.—Grand Canon, Arizona. Hance trail July 10th, 1892; one. A small blackish lampyrid, with thorax red on sides.*

Chauliognathus basalis, Lec.—Grant County, N. M. (W. J. H.); two.

Chauliognathus scutellaris, Lec.—Las Cruces, N. M., August 19th; one.

Collops bipunctatus, Say.—Grand Canon, Arizona. Plateau on rim at Hance's. July 7th, 1892. Blue-green, thorax fulvous with two black spots; head black at base, including eyes, fulvous anteriorly and antennæ fulvous with great enlargement of third joint.*

Pristoscelis rufipes, Mots.—Las Cruces, N. M. Several beaten from flowers and foliage of mesquite (*P. juliflora*), May 10th, 1891. On mesa. Another beaten from same plant three miles south of Mesilla, May 16th, 1891. This is a very small pubescent elongate beetle. It is smaller, blacker and not so pubescent as *P. suturalis*.

Pristoscelis suturalis, Lec.—Las Cruces, N. M. Several beaten from mesquite (*P. juliflora*), May 16th, 1891, three miles south of Mesilla. A small pubescent beetle.

Cymatodera Belfragei, Horn.—Chaves, N. M., August 6th, 1892; one. Elongate, blackish species.

Trichodes ornatus, Say.—Hart Little Spring, Arizona, July 4th, 1892; two. Grant County, N. M. (W. J. H.); five. *

Clerus spinola, Lec.—Las Cruces, N. M. (?).

Hydnocera tricondylæ, Lec.—Cocanini Plateau, Arizona, July 6th, 1892; one.

Lucanus mazama, Lec.—Grant County, N. M. (W. J. H.); one ♀.

Platycerus oregonensis, Westw.—Hart Little Spring, Arizona, July 14th, 1892; three.*

Phanaeus quadridens, Say.—Grant County, N. M. (W. J. H.); one ♂. This species is same size as *difformis*, but dark green without

bronzy lustre, and elytra smooth. The strong backwardly curved horn on head of ♂ reaches back nearly to base of elytra.

Phanaeus difformis, Lec.—Grant County, N. M. (W. J. H.); 2 ♂'s and 1 ♀.

Atanius laevis, Horn.—Las Cruces, N. M. Flying in summer.

Aphodius granarius, Linn.—Santa Fé, N. M., April 20th, 1892.

Mr. J. F. Wielandy sent this species, reporting it to be doing extensive damage to his hot beds by issuing in immense numbers from the compost in the beds, thus throwing out the newly-sprouted seedlings, roots and all. Destroyed three-fourths of his young plants. He reports that "thousands upon thousands" issued. The layer of compost consisted of old rotten manure mixed with earth, and was put on top of the beds. Beneath this was a three-foot layer of fresh dung to furnish heat. The injury was done by the mere mechanical force of the issuing of the insects.

Ochodæus striatus, Lec.—Winslow, Arizona, July 19th, 1892; one. A small pale rufous scarab.

Macrodactylus uniformis, Horn.—Near Rincon, N. M., June 13th, 1892; one. On mesquite or weeds.

Diplotaxis brevicollis, Lec.—Apache Spring, Socorro County, N. M., June 21st, 1892; one. Black species.*

Diplotaxis truncatula, Lec.?—Rincon, N. M., June 14th, 1892; one. Blackish species.*

Diplotaxis Haydenii, Lec.?—Rincon, N. M., June 13th, 1892; one. Rufous brown species.*

Listrochelus disparilis, Horn.—Continental Divide, Tenaja, N. M., August 1st, 1892; six specimens, attracted to light of camp fire at night.*

Listrochelus scoparius, Lec.—Continental Divide, Tenaja, N. M., August 1st, 1892; six specimens, attracted to light of camp fire at night Flagstaff, Arizona, July 3rd, 1892; one.*

Polyphylla 10-lineata, Say.—Flagstaff, Arizona. A 1 Ranch, Arizona Cattle Co., July 15th, 1892; one. Attracted to light in evening. A gray-brown scarab, conspicuously striped with whitish.

Plusiotis gloriosa, Lec.—Grant County, N. M. (W. J. H.); three.

Cyclocephala immaculata, Oliv.—Las Cruces, N. M. Attracted in numbers to light in houses in evenings in summer. A pale coloured chafer.*

Ligyryus gibbosus, DeG.—Las Cruces, N. M. Attracted to light.*

Ligyryus ruginasus, Lec.—Grant County, N. M. (W. J. H.); one. Light yellowish-rufous in colour.

Xyloryctes satyrus, Fab.—Grant Co., N. M. (W. J. H.); one ♀.

Strategus julianus, Burm.—Grant Co., N. M. (W. J. H.); a pair, ♂ ♀.

Dynastes tityus, Linn.—Grant County, N. M. (W. J. H.); one ♂. This species may be known by the lower or cephalic horn having two prongs at the end, and by the short stout spine at lower base of thoracic horn. Length to tip of horns, over 60 mm.; width, 26 mm.

Dynastes Grantii, Horn.—Grant County, N. M. (W. J. H.); one ♂. But slightly smaller than *D. tityus*, the lower or cephalic horn shorter and simple at end, and no spine at base of thoracic horn.

Allorhina mutabilis, Gory.—Grant County, N. M. (W. J. H.); Las Cruces, N. M. In some specimens the green is restricted to the inner basal portion of each elytron.

Gymnetis, sp.—Grant County, N. M. (W. J. H.); one. A soft black cetoniid, with hardly a greenish shade except below.

Euphoria Kernii, Hald.—Las Cruces, N. M., June 28th, 1891. There are two forms of this species. Six were taken of the beautiful yellowish or flavous, and three of the blackish with creamy markings on elytra; all flying about over ground in sandy and bear spot near sheds at College.

Euphoria inda, Linn.—Grant County, N. M. (W. J. H.); one.

Cremastochilus crinitus, Lec.—Grant County, N. M. (W. J. H.); one. Wholly brownish-black.

Derobrachus geminatus, Lec.—Las Cruces, N. M. A female specimen taken is 83 mm. long by 26 mm. broad. This is a giant prionid. A male specimen was taken August 22nd, which was 54 mm. long by 16½ mm. broad. It is elongate, narrowed and shining brown.

Prionus californicus, Mots.—Las Cruces, N. M. A female specimen is 53 mm. long by 23 mm. broad. Antennæ are not stout in this sex. Another female taken by W. J. Howard in Grant County (1882) is 40 mm. long by 17 mm. broad. A male, with

heavy serrate antennæ, was taken in Holbrook, Arizona, June 26th. Another male was taken by Mr. W. J. Howard, in Grant County. It measures 38 mm. long by 15 mm. broad.

Crioccephalus productus, Lec.—Cedar Ranch, Arizona, July 6th; one. Blackish in colour.

Rhomaleum simplicicollis, Hald.—Grant County, N. M. (W. J. H.); two.

Dendrobias quadrimaculatus, Dup.—Las Cruces, N. M. The male has long clasp-like mandibles. But some males also occur which are smaller, and have smaller clasp-like mandibles. Two on *Prosopis juliflora*, June 25th, ♂ ♀, but taken separately. Seven on *Sphaeralcea angustifolia*, June 30th, one pair being *in coitu*. One on willow (*Salix*), July 16th.

Stenaspis verticalis, Serv.—Las Cruces, N. M., June 28th; one. On *Prosopis juliflora*. This species differs from *S. solitaria* by the thorax being reddish or brownish-yellow. A specimen taken on same plant June 29th, Las Cruces, N. M., has also the front half of elytra more or less reddish, like the thorax.

Stenaspis solitaria, Say.—Las Cruces, N. M., June 28th, 1891. One of this very large, elongate, pure black longicorn on mesquite (*P. juliflora*). June 29th, 1891. Another on same plant.*

Tragidion annulatum, Lec.—Grant County, N. M. (W. J. H.); one. The antennæ are shorter and stouter than in *T. fulvipenne*, and yellow on median portion.

Tragidion fulvipenne, Say.—Winslow, Arizona, June 29th; one. On plant No. 261, N. M. Agricultural College Herbarium. A black species, with elytra orange-yellow except at bases.

Aethecerus latecinctus, Horn.—Mesilla, N. M., May 16th. On mesquite. Beaten from flowers of *P. juliflora*, three miles south of Mesilla. It much resembles a *Neoclytus*.

Batyle suturalis, Say.—Las Cruces, N. M.; three.*

Schizax senex, Lec.—Las Cruces, N. M., March 27th; one. On mesquite (*P. juliflora*); on a twig.

Tylosis maculata, Lec.—Sabinal, N. M., August 7th. One specimen having two black spots at base of each elytron, and a larger one near tip. One from Grant County, N. M. (W. J. H., 1882),

has the spot near tip of elytron very large, and also another intermediate one same size. Another from same source lacks the spot near tip; while still another lacks also the middle or intermediate spot, thus having only the two spots at base of each elytron. The species is orange-red, with head, antennæ and legs black, and with five black spots on proscutum.

Crossidius intermedius, Ulke.—Las Cruces, N. M. Common on a yellow-flowering weed (*Solidago* sp. ?).

Stenosphenus debilis, Horn.—Grand Canon, Arizona. Hance trail; 3,000–4,000 feet below rim. July 11th, 1892; one. A small elongate blackish longicorn.*

Neoclytus irroratus, Lec.—Grant County, N. M. (W. J. H.); one. Rather stout, with rounded prothorax, and femora thickened apically; soft brown in colour, faintly whitish on elytra.

Rhagium lineatum, Oliv.—Grant County, N. M. (W. J. H., 1882); one.

Acmaeops pratensis, Laich.—San Francisco Mt., Arizona, July 15th, 1892; one. A small short lepturian, with pale yellowish elytra, having a dark vitta on each from shoulder to a point two-thirds of the way to tip.*

Pachyta liturata, Kirby.—Grant County, N. M. (W. J. H.); one. A rather broad lepturian, blackish in colour except elytra, which are pale yellowish, each with broad longitudinal brown vitta but little narrower than the elytron.

Leptura propinqua, Bland.—Hart Little Spring, Arizona, July 14th, 1892; one. An elongate black lepturian. Elytra straw-coloured, with one black spot in middle on outside, tips black, and a very faint black spot outside anteriorly.*

Leptura convexa, Lec.—San Francisco Mt., Arizona, July 15th, 1892; one large and two smaller ones. Hart Little Spring, Arizona, July 14th; one.*

Leptura aspera, Lec.—Grant County, N. M. (W. J. H.). The number of this specimen was lost, but I am quite sure the locality is Grant County. It is a uniformly opaque black species.

Monohammus titillator, Fab.—Flagstaff, Arizona, July 2nd; one.

Tetraopes femoratus, Lec.—Seneca Ranch, Apache County, Arizona, June 25th, 1892; six specimens on a large broad-leaved *Asclepias*.* Grant County, N. M. (W. J. H.); one.

Coscinoptera axillaris, Lec.—Las Cruces, N. M.; one. This is a gray species with red on the outer base of elytra.

Cryptocephalus leucomelas, Suffr.—Grand Canon, Arizona. Hance trail. July 11th, 1892; one. A yellow and rufous brown species.*

Cryptocephalus, sp.—Las Cruces, N. M., May 16th, 1891. Three specimens, two *in coitu*, on growing stalks of a *Solidago*, three miles south of Mesilla. This is a species of a beautiful clear yellow colour. It could not be specifically determined either in Washington or Philadelphia, a specimen having been sent both to Dr. Riley and to Mr. Liebeck.

Cryptocephalus, sp.—Hart Little Spring, Arizona, July 4th, 1892; one.*

Chrysochus auratus, Fab.—Las Cruces, N. M., August 19th; two.

Doryphora rubiginosa, Rog.—Grant County, N. M. (W. J. H.); three. A tawny species.

Chrysomela dislocata, Rog.—Las Cruces, N. M., June 29th to 30th. On *Sphaeralcea* (*Malvastrum*) *angustifolia*. (See Insect Life, V., p. 39.)*

Chrysomela serpentina, Rog.—Las Cruces, N. M. Last of June. On *Sphaeralcea angustifolia*.*

Chrysomela sylvia, Stal.—Grant County, N. M. (W. J. H.); three.

Diabrotica vittata, Fab.—Las Cruces, N. M., July 8th, 1891. In small numbers on squashes on College farm. Eddy, N. M., August 14th, 1891. From F. E. Downs.

Galeruca (*Trirhabda*?) *nitidicollis*, Lec.—Squaw Spring (south of Navajo Springs), Arizona, July 24th, 1892. A large number found on *Gutierrezia microcephala*, all adults. They were observed eating the leaves. *In coitu* at this date.

Galeruca notata, Fab.—Belen, N. M., August 7th. In numbers on *Helianthus annuus*, eating the leaves.

Oedionychis scalaris, Melsh.—Grand Canon, Arizona. Hance trail, toward rim. July 12th, 1892. Quite numerous on leaves of a bush. A very active flea-beetle, straw-coloured with five black dots on each elytron.*

Haltica oblitterata, Lec.—Grant County, N. M. (W. J. H.); one.

Phyllotreta pusilla.—Santa Fé, N. M., May 25th, 1892. Received from Mr. J. R. DeMier, with report that they were very destructive to cabbages. A small dark greenish flea-beetle.

Ocotoma marginicollis, Horn.—Grand Canon, Arizona. Hance trail. July 10th and 11th, 1892; four.*

Chelymorpha phytophagica, Cr.—Las Cruces, N. M., June 20th, 1891. On *Helianthus annuus*. A fine large black and red species.

Bruchus pauperculus, Lec.—Las Cruces, N. M.

Bruchus, sp.—Las Cruces, N. M. Bred from pods of tornillo (*Prosopis pubescens*). Pods were gathered in November, and the beetle issued in March following. Many more issued later.

Epitragus canaliculatus, Say.—La Vega de San José, N. M., August 4th; two.

Cryptoglossa laevis, Lec.—Grant County, N. M. (W. J. H.) Also Las Cruces, N. M. (See Insect Life, V., 39-40.)

Microschatia morata, Horn.—Grant County, N. M. (W. J. H.); one. A stout tenebrionid, wholly light brownish in colour.

Asida sordida, Lec.—Grant County, N. M. (W. J. H.); one. A blackish-brown tenebrionid, with rough elytra. Another specimen from same source is smaller and narrower, and constitutes a variety of this species.

Asida obovata, Lec.—La Vega de San José, N. M., August 4th; one. A black tenebrionid, with the body widened behind. Also one from Grant County, N. M. (W. J. H.), which differs in having the elytra rufous.

Eusattus reticulatus, Say.—Winslow, Arizona, June 29th; two. One from Grant County, N. M. (W. J. H.)

Eusattus muricatus, Lec.—Winslow, Arizona, June 29th; one.

Eleodes caudifera, Lec.—Winslow, Arizona, June 29th; two.

Trogloderus costatus, Lec.—Winslow, Arizona, June 29th; one. This is a blackish tenebrionid with grooved elytra.

Hymenorus punctatissimus, Lec.—Las Cruces, N. M., July 8th, 1891. Found a good many larvæ, probably this species, in burrows

of *Diatraea saccharalis* in growing stalks of corn on College farm, the burrows containing dead chrysalids of the *Diatraea*. Adult beetles of this species were found in numbers with them in the burrows. July 16th, 1891. Large numbers of the beetles found in sheaths of sorghum infested with aphides, on College farm.

Oxaxis pallida, Lec.—Winslow, Arizona, July 19th to 20th; two.

Myodites scaber, Lec.—Chaves, N. M., August 6th, 1892; two.*

Ophryastes tuberosus, Lec.—Grant County, N. M. (W. J. H.), one. A chunky grayish weevil, with prothorax warted on outer edges.

Eupagoderes decipiens, Lec.—Grand Canon, Arizona. Hance trail. July 11th, 1892; one.*

Eupagoderes desertus, Horn.—Winslow, Arizona, June 29th, 1892. A pair *in coitu*. The antennæ of both were infested with a small red mite. Large whitish gray rhynchophor. On plant No. 290, N. Mex. College Herbarium.*

Cyphus lautus, Lec.—Grand Canon, Arizona. Hance trail, near rim of canon, July 12th, 1892; one. A small grayish curculionid.*

Otiorrhynchid gen. et. sp. ?.—Continental Divide, Tenaja, N. M., August 2nd, 1892; one.

Sitones californicus, Fah.—Las Cruces, N. M.; one.

Anthonomus canus, Lec.—Apache Spring, Socorro County, N. M. A small grayish weevil. Bred from galls of *Eurosta bigelovia* on *Bigelovia graveolens* collected June 21st, 1892. (See CAN. ENT.; 1893, p. 52.)

Tychius setosus, Lec.—Las Cruces, N. M. A single specimen beaten from mesquite (*P. juliflora*), three miles south of Mesilla, May 16th, 1891. This is a minute rhynchophor.

Scyphophorus acupunctatus, Gyll.—Grant County, N. M. (W. J. H.); one.

Rhodobaenus pustulosus, Gyll.—Grant County, N. M. (W. J. H.); one. Much resembles *13-punctatus*. Brick-reddish in colour.

CORRESPONDENCE.

ACRIDIDUM AMERICANUM.

In October last, Mr. G. C. Anderson, upon one of his visits to me, enquired what was the largest grasshopper of the country, as he had taken one which had attracted his attention on account of its size. I showed him what we had in the collection of our native species, when he remarked that it was larger and prettier than anything that was there. He said he would bring it up some time. When he did, I was surprised at the striking difference in its appearance from anything I had ever observed. He said I might retain it, which I was very willing to do, and as I could not determine it, I spread its wings and waited till the time of our annual meeting, when Mr. Fletcher at once pronounced it to be *Acridium Americanum*, and the first reported to be taken in Canada. In his Eighth Missouri Report, Prof. C. V. Riley (page 104) thus speaks of it: "It is our largest and most elegant locust, the prevailing colour being dark brown, with a broad pale yellowish line along the middle of the back when the wings are closed. The rest of the body is marked with deep brown, verging to black, with pale reddish-brown, and with whitish or greenish-yellow; the front wings being prettily mottled, the hind wings very faintly greenish with brown veins, and the hind shanks generally coral-red with black-tipped white spines. The species is quite variable in colour, size and marks, and several of the varieties have been described as distinct species." In another place the Professor remarks: "It has a wide range, hibernates in the winged condition, and differs not only in size and habits from the Rocky Mountain locust, but entomologically is as widely separated from it as a sheep from a cow." I would describe the front wings of the specimen before me as being light brown, semi-transparent and mottled with darker brown; the hind wings as hyaline, extremely delicate in texture and beautifully reticulated with dark brown. It measures three and a-half inches in expanse of wing. This species has been reported as causing considerable damage at times on the south side of Lake Erie, from whence probably it has come to us.

J. ALSTON MOFFAT, London, Ont.

* * The Editor regrets to state that two of his letters to the printers of this Magazine have recently gone astray in the mails. They contained a paper by Mr. McGillivray on "New Hampshire Tenthredinids," the second part of Mr. C. F. Baker's "Studies in Siphonaptera," and a review by Prof. Webster of the last volume of Dr. McCook's "Spiders and their Spinning Work." These articles were intended to have been published in the current number.

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No. 3.

DESCRIPTIONS OF SOME NEW SPECIES OF EPIPASCHIINÆ AND PHYCITIDÆ.

BY REV. GEO. D. HULST, BROOKLYN, N. Y.

EPIPASCHIINÆ.

Oncida luniferella, n. sp.—Tongue blackish with some light gray scales; labial palpi and face light gray; antennæ blackish gray; antennal projection light gray at base, becoming blackish gray towards summit; thorax gray, patagia lighter, becoming nearly white posteriorly; abdomen gray with black scales intermixed, somewhat washed with fuscous, and often stained with yellowish. Fore wings light gray at base to raised scale ridge immediately before the first cross-line; this line is white, rounded from costa to median vein, and thence to inner margin, edged on both sides with black and preceded by a scale ridge which is reddish brown in colour; middle field light gray, glistening, slightly powdered with blackish scales, this colour reaching to outer margin posterior to vein 5; near middle of field and between vein 1 and median vein a raised scale tuft, blackish. Outer line distinct at costa, whitish, becoming lost in the ground colour behind vein 5; this line is with a deep inward sinus from costa to about vein 5, forming a sort of lunule, which is edged on both sides with black; the inner edging is broader posteriorly, and there somewhat washed with reddish; the outer, broad, nearly filling the apical space, washed with reddish posteriorly; a marginal line of black dots. Hind wings glistening translucent whitish fuscous, with a faint yellowish stain. Beneath fore wings fuscous to outer line, that being fainter than above; apical space reddish. Hind wings slightly more fuscous and duller than above. Expands 28 mm.

Colorado. Six examples from Mr. David Bruce.

Benta Slossonii, n. sp.—Expands 25 mm. Palpi and face dark fuscous; antennæ blackish fuscous; thorax blackish, mixed somewhat with gray scales; abdomen dark fuscous, almost black, each seg-

ment edged with lighter colour posteriorly. Fore wings, basal line not very distinct, dark gray, sinuous, strongly angulated at vein 1; basal field blackish, much mixed with gray scales, especially along costa, and slightly marked with reddish at middle at median vein; middle field blackish gray, with three narrow black lines: the first edging basal line, the third limiting the field outwardly, this forming a sinus rounding inwardly within discal spot to base of veins 3 and 4, then another less pronounced sinus to inner margin, forming a prominent tooth at veins 3 and 4; the second line is slightly within and sub-parallel with the third; on the space between the first and second black lines are two oval black rings, one on cell and the other just below it, joined at each end with first and second cross-lines; outside the basal field the colour is light gray, more or less mixed with black, the outer line whitish, indistinct, showing with the darker edgings almost straight across the wing; outer field blackish, with gray intermixed, giving indications, especially apically, of a scalloped submarginal line, as well as one narrowly at margin. Hind wings, even fuscous blackish. Beneath all wings even dark fuscous, with a gray spot on fore wings along costa at beginning of outer line.

South Florida. One specimen, a ♀, from Mrs. Slosson, taken in early spring. The species is provisionally placed in the genus *Benta*.

PHYCITIDÆ.

Pyla metallicella, n. sp.—Expands 32 mm. Palpi ascending, long, black; head, thorax, abdomen and wings dull smoky black, without any indications of lines. The palpi on the outside, the face, the thorax and fore wings strongly iridescent with bronze green, this being specially marked on the patagia and base of wings; abdomen somewhat bronzy; hind wings without iridescence. Beneath all parts blackish; the thorax, legs, fore wings and anterior margin of hind wings being strongly iridescent; on the body this has a coppery tint.

Colorado. One ♂, from Mr. Bruce. A most beautiful insect, with wings narrower and longer than *P. scintillans*, Grt., and with a much more decided iridescence.

Pyla bistriatella, n. sp.—Expands 25 mm. Head, thorax and fore wings deep black, the fore wings with two broad white stripes, the inner straight, the outer slightly wavy and parallel with outer margin; hind

wings and abdomen dull black. The head, thorax and fore wings are strongly iridescent with dark bluish-green, the abdomen less so. Beneath as above, but less iridescent.

Yosemite Valley, Cala. One ♂. Differs somewhat in structure from the typical *Pyla*. The labial palpi are nearly horizontal, second member long, heavily scaled; end member very small, scarcely visible; maxillary palpi small, not scale or pencil tufted.

Pyla incorruscella, n. sp.—Expands 21 mm. Palpi and face deep black; thorax deep black with a few dark gray scales; fore wings dull black, intermixed with some dark fuscous scales; two cross-lines of stained white, the inner oblique, rounded, diffuse, the outer angulated in at vein 6, rounded outwardly from there to vein 5, then slightly wavy to inner margin. Beneath dark fuscous, two lighter fuscous spots along costa, one before discal space and the other at end of second cross-line. No iridescence on any part of the insect.

Colorado. One ♂, from Mr. Bruce. Smaller than *P. anecla*, without iridescence, maxillary palpi small, but scale tufted.

Pyla anecla, n. sp.—Expands 25 mm. Labial palpi grayish fuscous below, blackish, with blue-green iridescence above; face black, bluish iridescent; thorax black, with coppery-bronze iridescence. Wings blackish in ♂, the fore wings with scattered iridescent scales on middle of wings, scarcely any showing along edges. ♀ fore wings blackish, almost completely greenish-yellow iridescent; hind wings black, with reddish-brown tint in some lights. Beneath blackish, slightly iridescent in ♂ along anterior margin of hind wings; all parts completely iridescent in ♀.

Colorado. One ♂, two ♀ ♀, from Mr. Bruce. The labial palpi are ascending, long, end member long, maxillary palpi small, with two or three long scales at end. Abdomen of ♂ with lateral scale tufts on last segment, and a row of orange-yellow hair tufts below. ♀ with antennæ bent above base, and a slight tuft in sinus, almost as distinct as that of the ♀; maxillary palpi also quite as prominent as in ♂. The sex is beyond question, as the ovipositor is strongly protruded.

Dioryctria Brucei, n. sp.—Expands 24 to 28 mm. Palpi gray, black at tips; head above whitish; thorax gray, more whitish on dorsal parts; abdomen alternating whitish and gray on each segment, very slightly washed with ochre. Fore wings whitish, more or less overlaid with blackish scales, giving a clear gray appearance; cross-lines whitish, very irregular, not sharply outlined. The basal with a long outward

tooth below cell, a small inward one just below this ; also a blackish spot outwardly at costa, on cell, and towards inner margin, giving the relics of an outer marginal black line. Outer line with large, deep teeth inwardly, at cell, and below it, these coalescing with the inner line in a whitish streak ; between these, three even teeth outwardly ; submarginal line whitish, scalloped, or showing only in whitish dashes at end of veins ; margin with dark lunules between the veins. Hind wings ochre-fuscescent, darkest at margins ; beneath nearly colour of hind wings, the lines of fore wings faintly showing.

There is some variation in the specimens ; in some the cross-lines are less diffuse, the angles more even, and a double black discal spot apparent on fore wings.

Colorado. Four ♂ ♂, 5 ♀ ♀, from Mr. Bruce.

Epischmia incanella, n. sp.—Expands 30 mm. Palpi rough scaled, drooping, light gray, with dark scales intermixed ; tongue scarcely longer than palpi ; head gray ; thorax gray ; abdomen light fuscous gray, washed with ochre. Fore wings gray, much overlaid with dark gray or blackish, more lightly along the costa, which thus shows in a light gray streak reaching to outer line ; inner line indistinct, broad costally, narrow and dentate towards inner margin, faintly marked with two or three black spots outwardly ; a black spot at centre of outer margin of cell ; outer line very far towards outer margin, quite indistinct, but an outward rounding at middle, and a tooth inward near inner margin ; a tendency at margin to have the veins marked with black dashes. Hind wings light, with a fuscous shading. Underneath light fuscous, the fore wings somewhat the darker, except on marginal space.

Colorado. Two ♀ ♀, from Mr. Bruce.

Volusia pallidipennella, n. sp.—Expands 20 mm. Palpi, head, thorax and abdomen light gray, with a slight fuscous washing, the tegulæ lighter, almost white, and the abdomen more stained with fuscous. Fore wings whitish, sprinkled with black scales, giving a light gray appearance ; cross-lines indistinct, the basal consisting of a broad, dull reddish band, not reaching costa, edged each side with whitish, and this with broken blackish, not very distinct ; discal spot black, distinct ; outer line whitish, far out, sub-parallel with margin, slightly bent at middle. Hind wings light fuscous, darker at margins. Beneath light fuscous, the fore wings darker, especially towards apex, where the outer cross-line shows.

Colorado. One ♂, from Mr. Bruce.

Pinipestis umbripennis, n. sp.—Expands 24 mm. Palpi black, a little grayish at tips; head and thorax black; abdomen blackish, a little lighter on each segment posteriorly. Fore wings mouse-black, slightly grayish across basal portion within scale ridge; also a triangular, dark grayish space along costa on middle field, enclosing double black discal spots, and a faint grayish marginal shade. Basal line not apparent; scale ridge strong, jet black; outer line narrow, dark gray, bent inward at end of cell, then with three even teeth outward, then angled inward before reaching inner margin. Hind wings deep black, with a blackish-brown reflection. Beneath almost uniform dull somewhat glistening black.

Colorado. One ♂, from Mr. Bruce.

Salebria delectella, n. sp.—Expands 33 mm. Palpi thin, lightly scaled, gray; thorax blackish-gray, with a subdorsal tuft of orange-yellow scales on each side; abdomen blackish-gray, and gray-ringed on each segment. Fore wings, general colour blackish-gray; basal space, except along costa, dull reddish; middle field, first half of ground colour, the outer half much lighter gray; outer field, except towards costa, dull reddish; discal spot a large white lunule, concave side outward; basal line light gray, well out, waved, dentate; outer line gray, somewhat indeterminate on borders, with a more prominent outward dentation at middle; marginal line black. Hind wings light translucent fuscous, with black marginal line, except along inner margin. Beneath, fore wings dark fuscous, the outer line faintly showing; hind wings much as above.

Colorado. Two ♀ ♀, from Mr. Bruce.

In general appearance somewhat resembling *Salebria tarmitalis*, which is now put by Mr. Ragonot under the genus *Myreala*. This may also belong there, as the cell of the hind wings is very short. But as I have no male, the position of the insect is in doubt. The thoracic tufts are somewhat peculiar.

Salebria georgiella, n. sp.—Expands 17 mm. Palpi fuscous gray, blackish in front, strong, heavily scaled, reaching above head; maxillary palpi strongly pencil tufted, bright yellow; antennæ brownish fuscous, the scale tuft in bend very heavy; head fuscous gray; thorax gray or bluish-gray; abdomen ringed with ochre-fuscous and yellow ochre, somewhat tufted at end. Fore wings gray, washed with fuscous along costa, becoming clear gray posteriorly; a dull brick-red central dash at base, and a large dull brick-red spot within basal line posterior to centre and reaching

thence to inner margin, somewhat quadrate in form ; lines light gray, not well defined, the basal with an outer angle at middle and towards inner margin ; outer line rounded from costa to centre, then angled outwardly, then nearly straight to inner margin, all faintly serrate ; discal spot distinct ; outer line edged both sides with darker fuscous. Hind wings ochre-fuscous, dark iridescent at apex. Beneath even dark fuscous, hind wings somewhat lighter than fore wings.

Charlotte Harbor, Florida. One ♂, from Mrs. Slosson.

CANADIAN COCCIDÆ.

III. A LECANIUM, PERHAPS IDENTICAL WITH *L. RUGOSUM*, SIGNORET.

BY T. D. A. COCKERELL, N. MEX. AGR. EXP. STA.

I have just received from Mr. James Fletcher a small bottle of scales found on plum at Queenston, Ontario. He writes concerning them: "Dead scales picked from a plum tree in the Niagara district, where it was very abundant on plums and much rarer on peach trees growing amongst the plums."

Directly I saw these scales, they struck me as something unusual, and yet I rather expected they would prove to be some form of *L. persica*. Unfortunately they were full of the mycelium of a fungus (doubtless *Cordyceps*), as well as in some cases containing a Chalcidid parasite, so that their specific characters were very hard to make out. The fungus, which must be a very important check to their increase, was not noticed on examination with a lens ; but on boiling the scales in liquor potassæ, they stained the liquor brown, and a microscopic examination showed the fungus quite plainly. Of course, from mere mycelium no determination could be made. I saw in one case what looked like germinating spores, but perhaps in this I was mistaken.

Assuming that the scales were not *persica*, I went through the descriptions to see what they would fit better. *Lecanium rugosum*, Sign., seemed the very thing, though comparison in detail revealed some differences.

The following information on *Lec. rugosum* was translated from Signoret by my wife. I transcribe it for the use of those who have not the original :

L. RUGOSUM, Signoret, 1873.

"Among the species which are found on the peach-tree, there is one which is neither *L. persica* nor *L. rotundum*, and which approaches more nearly to the latter than to the former.

"*L. rugosum* is round, rather elevated and very rugose on the sides, where there is a strong punctuation more or less confluent, and between the points smooth spaces forming a kind of hills. It is of a dark brown; the antennæ are of eight joints, of which the third, 'mutique,' is longer by itself than the five following ones, the fourth, fifth, sixth and seventh of equal length. By the antennæ alone, as well as by the shape, it is easy to distinguish *L. rugosum* from the two other species; in *persica* the fourth joint is longer by itself than the three following, and in *rugosum* it is equal to the others; in *rotundum* the fourth joint is equal to the third, and perhaps even longer; further, there are only seven joints to the antennæ instead of eight.

"We found this species on peach-trees in our garden, at Clamart. It is not very abundant. Its length is from 4 to 5 mm. by about the same width; height from 2 to 3 mm.

"One other peculiarity we ought to point out in this species is the form of the posterior tarsi, which are as if flattened, wider than the tibiæ and a third shorter.

"The anterior tarsi are ordinary, but have a furrow on the internal face. The claws are very wide at the base; the digitules of the claws are long and unequal in size, the one forming a more extended 'cornet' than the other. The digitules of the tarsi are long and straight, inserted at a distance from one another. The tibiæ, in general, present four to five hairs at the summit, one longer than the rest; the femora have two at the summit, the trochanters one very long one, the coxæ two or three.

"We have never met with the males, but have seen several white shells whence they had emerged. This shell is smooth in this species and rugose in *rotundum*."

So far Signoret. Now to return to the Queenston scales. We have here a scale differing from ordinary *persica* in being almost round in outline, very dark, and especially very rugose. Surely, then, it is Signoret's *rugosum*? But, if at first this seems an inevitable conclusion, it is rather contradicted by the microscopic char-

acters. I found, even after examining many specimens, but one antenna; but this was clearly seen to be 7-jointed, not 8-jointed, as in *rugosum* and *persicæ*. I found no legs in position, but several fairly well-preserved ones broken from the bodies. These showed the long digitules, but I did not get a sight of the peculiar posterior tarsus. The following description gives the details I found:

LECANIUM FROM QUEENSTON.

♀. Antenna 7-jointed, 3 longest, 4 a little shorter, 7 a little shorter than 4, 2 shorter than 4, 5 and 6 shortest and about equal. Formula approximately 34721 (56).

Legs well-developed; trochanter and coxa each with a hair; femur rather slender, not very much longer than tibia; tibia about one-third longer than tarsus. Tarsal digitules slender, very long. Digitules of claw also long, extending considerably beyond tip of claw, with quite large knobs. Claw nearly straight. Derm with large gland-pits, often double. Anal plates with their caudolateral sides longer than the cephalolateral.

Of species with 7-jointed antennæ, there is *L. rotundum*; but this is out of the question, from its globose, nearly smooth scale. But how about *L. juglandis* (*juglandifex*), with which I have identified a species sent by Dr. Lintner from Rochester, N. Y., on plum? The antenna of this Rochester insect is just like the antenna of the Queenston species; in fact, the microscopical characters of these forms are so much alike as to strongly suggest their identity. Yet the scales seem decidedly different.

Some one may here say, How about the *Lecanium cerasifex*, Fitch., 1856? This was said to be hemispherical, nearly the size and shape of a half-pea, black, more or less mottled with pale dull yellow dots. I confess I do not know what this is, and look with some doubt on identifications of it from such a description as Fitch gave. Until some one has given us a better description from the type, I think *cerasifex* must be put in the doubtful list. There is no good reason for supposing it identical with the Queenston scale.

The solution of the question here raised must probably be left in the hands of one who can study the insect, in all its stages, on the spot. The following questions might be addressed to a suitable enquirer:—

- (1.) *L. rugosum*, hitherto known from France, closely resembles our insect in outward form. Can the diversities in microscopic details be reconciled?

- (2.) *L. juglandis*, from Rochester, N. Y., closely resembles our insect in microscopic characters. Can the diversities in outward form be reconciled?
- (3.) Is it possible that the parasitic fungus would so alter the scale in its growth as to make it seem like a different species?
- (4.) Can the male scale be found, and if so, is it smooth or rough?
- (5.) Can the Queenston people tell anything of the origin and spread of the scale?

[Mr. Cockerell has more recently examined other material from Queenston, Ont., and also some from Geneva, N. Y., and is strongly of opinion that the species in both cases is the same as the Rochester (N. Y.) *L. juglandis*. The scales are shiny, red-brown; in both cases accompanied by hibernating young.—J. F.]

SOME NEW SPECIES OF ROBINSONIA.

BY W. SCHAUS, TWICKENHAM, ENGLAND.

Robinsonia Grotei, sp. nov.—Head white, posteriorly shaded with yellow. Collar white, with a central brown spot. Thorax brown, with a central white line; patagia white, laterally edged with brown. Abdomen dorsally brownish-yellow, with a subdorsal row of small white spots, and a lateral row of small black spots; underneath whitish. Primaries above white, with the margins broadly brown, except at the apex, where the white extends to the fringe; an oblique brown band, from the costal margin at a third from the base to the inner angle, separates the white into two large spaces. Secondaries white. Primaries underneath white, showing indistinctly the markings of the upper surface.

Ex., 45-47 mm.

Hab.—Rio Janeiro, Trinidad; Jalapa, Mexico.

This species is very closely allied to *Robinsonia formula*, Grote, but differs in the straight brown margins which are sinuate in *R. formula*.

Robinsonia perfecta, Hy. Edw., is a synonym of *Sallæa ochrosteria*, Feld., and *Turuptiana obliqua*, Walk., the last being the oldest name, and generically quite distinct from *Robinsonia*, which is most closely allied to *Ormetica*, Clem. The genus *Ormetica* is congeneric with *Euplesia*, Feld., and will have priority over the latter. *Ormetica sphingiformis*, Clem., has been redescribed by Mr.

Druce as *Automolis inutata*, which is placed by Kirby as a synonym of *Chelonia taniata*, Guér. I have not read Guérin's description, but presuming Mr. Kirby is right, the species will stand as *Ormetica taniata*, Guér.

Robinsonia fogra, sp. nov.—Head yellowish. Collar white. Thorax white, with some gray marks; patagia finely edged with gray. Abdomen above brownish yellow; some clusters of brown hairs towards the base; a subdorsal row of white spots and a lateral row of black spots; underneath white. Primaries above white, the veins gray, the margins clouded with gray, and a terminal row of gray streaks between the veins; an indistinct and irregular outer gray line. Secondaries above whitish, clouded with gray along the margin; the fringe dark gray. Underneath, the wings are similar, but with less gray, and the white ground colour is slightly iridescent.

Ex., 44 mm.

Hab.—Aroa, Venezuela.

Robinsonia Lefaiivrei, sp. nov.—Head brown, minutely spotted with white. Collar brown, with four white spots. Thorax brownish; patagia white, edged with brown. Abdomen above brown, with a subdorsal orange line; underneath white. Primaries above white; the costal margin broadly brownish yellow; the cell filled in with brown scales; the outer and inner margins broadly brown, the latter with a white streak about its centre; veins 2, 3, 4, 6 and 7 brown, dividing the white portion into a series of spots, the largest being between the median and submedian veins, and beyond the cell between veins 4 and 6; the two apical spots the smallest and oval in shape. Secondaries above white, with a long brown streak from the base to the anal angle, and a shorter streak below vein 2, from the cell to the outer margin; the costal margin narrowly shaded with brown; underneath the same, with the markings less distinct.

Ex., 44 mm.

Hab.—Rio Janeiro.

I am indebted for this species to Monsieur Paul Lefaiivre, Chargé d'Affaires for France at Rio Janeiro. I have also seen a specimen in the collection of Mr. Neumoegen, of New York.

PRELIMINARY STUDIES IN SIPHONAPTERA.--II.

BY CARL F. BAKER, FORT COLLINS, COLO.

Family *Pulicidæ*, Tschb.

1880. Taschenberg, Die Flohe, p. 62.

Table of Genera.*

- A. Eyes well developed ; antennæ with circular incisions or cleft only on one side ; head and thorax usually stout and compact ; head rarely angulated in front ; lower edge of head and pronotum behind sometimes with combs, abdominal segments and discs of cheeks without.....*Pulex*.
- AA. Eyes wanting, or very rudimentary ; antennæ with circular incisions.
- B. Eyes entirely wanting ; head and thorax stout and compact ; head angulated in front, truncate ; discs of cheeks, pronotum, and several abdominal segments with combs of numerous spines, the whole body heavily bristled.....*Hystrihopsylla*.

* The genus *Stephanocircus*, Skuse (Records of Austral. Mus., II., 5, Sydney, Sept., 1890), with its single species, *Dasyuri*, Skuse, parasitic on *Dasyurus maculatus*, Kerr., I do not include in this table. As characterized, it possesses a most extraordinary structure. Should further study verify all points of the description, this genus will form a very interesting addition to the family. It, however, seems probable that two species have been confused, and that both are referable to known genera. The description (for a copy of which I am indebted to Mr. Wm. J. Fox) is as follows:—" *Stephanocircus*, gen. nov. Body elongate, especially in the female, bristly, noticeably stronger at the anal extremity. Antennæ capitate, four-jointed, the second joint in the female with long bristles extending to the tip of the fourth ; in the male very short ; fourth joint lamellar, apparently composed of nine segments. Head moderately large ; in the female with an exerted, cap-like patella in the front, strongly pectinated round its posterior margin, the face also strongly pectinated ; in the male the posterior margin of the head only pectinated ; eyes wanting in the female ; trophi less than the length of the head ; mandibles extremely slender, minutely serrated, encased in four-jointed labial palpi, which they somewhat exceed in length ; lingua extremely slender ; maxillæ elongate, triangular, somewhat exceeding the second joint of the labial palpi, with no apparent apical joint ; maxillary palpi four-jointed, the first and fourth of about equal length, the third shorter and the second the longest, acuminate ; joints of the labial palpi progressively diminishing in length and thickness. Prothorax in female with a strong pectinate fringe. Legs long, spinous ; coxæ of posterior two pairs with a distinct notch posteriorly at the apex ; femora very minutely and sparingly spined ; tarsi five jointed, the first, second and fifth joints long, the third shorter, the fourth shortest, half the length of the fifth ; claws microscopically denticulate.

" *Stephanocircus dasyuri*, sp. nov. Length of male, 1.90 mm. ; of female, 2.80 mm. Castaneous brown, nitidous. Head of the male convex above, of female flat. Eyes of male small, black. Pectinal fringes and setæ black or dark brown. Thorax long, in the female nearly the length of the body. Abdomen about twice as long as broad in the male, shorter in the female, darker castaneous brown in the female, bristly. Legs of a uniform pale castaneous brown. Habitat—New South Wales, on *Dasyurus maculatus*, Kerr."

BB. Eyes wanting, or very rudimentary ; head and thorax slender ; head usually long, rounded in front, vertex often more or less produced ; combs on head and pronotum, and sometimes on abdominal segments, that on the head of not more than four spines on each side *Typhlopsylla*.

Genus *Pulex*, Linn.

1746. Linnæus, Fauna Suecica.

1832. Curtis, British Entom., IX., No. 417. (*Ceratopsyllus*.)

1857. Kolenati, Wiener Entom., Monatsschrift, I., p. 65. (*Mono-psyllus*.)

1863. Kolenati, Hor. Soc. Entom., Ross, II., p. 32, etc. (*Trichopsylla*, *Ctenonotus*, *Ctenophthalmus*, *Ctenopsyllus*, *Ceratopsyllus*, and *Ctenocephalus*.)

Table of Divisions.

- A. Head beneath and pronotum behind without combs of spines... Division I.
- AA. Head beneath without, pronotum behind, with a comb of spines... Division II.
- AAA. Head beneath and pronotum, both with combs of spines... Division III.

Division I.—Table of Species.*

- A. Head above sloping obliquely forward, angled in front ; segments of abdomen each with 5 to 6 transverse rows of bristles ; second joint of antennæ without long bristles..... *kerгуelensis*.
- AA. Head above and in front evenly rounded ; segments of abdomen each with 1 or 2 transverse rows of bristles.
- B. Segments of abdomen each with 2 transverse rows of bristles ; size large ; length : male, 3 mm. ; female, 4 mm. ; head behind antennal groove with two rows of numerous long black bristles ; bristles on second antennal joint extending beyond end of third joint ; labial

* *Pulex tuberculiceps*, Bezzi (Bull. della Soc. Entomo., Ital., XXII., 1890, "Notes on Some Epizoid Insects"), belongs in Division I, and is nearly related to *P. globiceps*. It was taken from *Ursus arctos*, and is characterized by the truncated and medially tuberculated front, the subequal first and fifth joints of posterior tarsi, the slightly greater size and other minor details. Its position would be between *kerгуelensis* and *globiceps*. I have been unable as yet to obtain specimens of fleas from bears in this country. It is, however, a well-known fact among hunters in the West that the grizzly and silver-tip are sometimes found "alive" with them.

- palpi 5-jointed; meso-and-metathoracic pleura with numerous long black hairs; male claspers very large, sharp angled above posteriorly.....*globiceps*.
- BB. Segments of abdomen each with a single well-defined transverse row of bristles; size smaller: male, 2-2.5 mm.; female, 2.5-4 mm.; head behind antennal groove with very few scattering bristles; bristles on second antennal joint shorter than third joint; meso-and-metathoracic pleura with few scattering short hairs.
- C. Male claspers very small, slender and cylindrical; tarsi slender; of anterior tarsi, fifth joint as long as or shorter than 1 and 2 together, and as 2 and 3 together; of middle tarsi, fifth joint three times 4 or less, and less than 2; of posterior tarsi, fifth joint less than 3 and 4 together, second three times 4 or more, much longer than 5, and more than 3 and 4 together, while 1 is longer than 4 and 5 together; internal penis support short, not spirally coiled towards the front; labial palpi 4-jointed; pale brown in colour; length: male, 2 mm.; female, 2.5 mm.....*pallidus*.
- CC. Male claspers very large, half-oval; of anterior tarsi, fifth joint is longer than 1 and 2 together, and longer than 2 and 3 together; of middle tarsi, fifth joint is three times 4 or more, and as long as 2 or longer; of posterior tarsi, fifth joint as long as 3 and 4 together or longer, second less than three times 4, less than 5, and as long as 3 and 4 together or less, while 1 is longer than 5; internal penis support several times spirally coiled towards the front; labial palpi 3-jointed; colour varying between reddish and piceous; length: male, 2-2.5 mm.; female, 2.75-4 mm.
- D. Mandibles and hypopharynx very short, not reaching one-half length of anterior coxæ; joints of labial palpi robust, first joints longer than second, third longer than 1; maxillary palpi, with second joint in female shorter than 4; anterior lobe of exertible portion of penis* with upper half as broad throughout as lower half just above base.....*simulans*, n. sp.
- DD. Mandibles and hypopharynx longer, reaching more than one-half length of anterior coxæ; joints of labial palpi slender, first equals 3, second shorter; maxillary palpi with second joint in female much longer than 4; anterior lobe of exertible portion of penis with upper half very narrow and cylindrical.....*irritans*.

* See Wagner, Horæ. Soc. Ent., Ross. T., XXIII., pl. X., fig. 25, k.

Pulex kerguelensis, Tschb.

1880. Taschenberg, Die Flohe, p. 67.

This is a very unique and well-marked species. Taschenberg gives the proportional lengths of tarsal joints as follows :—On anterior legs first equals 5 ; on middle legs second equals 5 and equals 3 and 4 together, first is somewhat longer ; on posterior legs first is a third longer than 2, 3 and 4 together somewhat shorter than 2, and 5 a little longer than 3. Length of male is given as 2 mm., of female, 3 to 4.5 mm. The four known examples were collected on the Kerguelen Islands by Mr. Eaton, from *Pelecanoides urinatrix*, Gmel, and sent to Ritsema for determination.

Pulex globiceps, Tschb.

1840. Motschulsky, Bull. Soc. Imp. de Moscou, p. 170. (*P. vulpes*.)

1880. Taschenberg, Die Flohe, p. 66. (*P. globiceps*.)

A large flea, well separated by its elongated body and proportionally very small head, standing between *kerguelensis* and *irritans* with its allies. Taschenberg says of the maxillary palpi : “ their thick joints of almost equal length.” However, in specimens received from him, the second joint in the female is less than three-fourths of the fourth in length. He further says the antennal grooves are open, and the colour is darkish-brown, yellowish-gray posteriorly in mature females. The labial palpi in the specimens received from Dr. Taschenberg are certainly 5-jointed, the sutures between the several joints being equally distinct. In these specimens I find the comparative lengths of tarsal joints as follows :—In anterior legs the fifth joint is about as long as 1 and 2 together, and as long as 2 and 3 together ; in middle legs the fifth joint is three times 4 and longer than 2 ; in posterior legs the fifth joint is shorter than 3 and 4 together, and about two-thirds of 1, while the second is about twice 4 and less than 5. The following records have been made of its occurrence : From *Canis vulpes* (Halle, Taschenberg, and Holland, Ritsema), from *Meles taxus* (Zool. Gardens at Rotterdam), from *Canis*, sp. (Russia, Motschulsky).

Pulex pallidus, Tschb.

1880. Taschenberg, Die Flohe, p. 65.

I have before me a large series of specimens sent to me as a new species by Dr. Taschenberg. They were taken on *Mus albipes*, in the Island of Socotra. They coincide in every respect with the original description and illustrations of *pallidus*, and must be referred to that

species as it now stands. The specimens from the Berl. Zool. Mus., described by Taschenberg, were found on *Herpestes ichneumon*, in Egypt. The same or a nearly related *Herpestes* is found in Socotra, and as its habits resemble in many ways those of the *Mus*, it is very easy to see how the same species of flea might occur on both.

Pulex simulans, n. sp.

Two specimens of this flea, taken from opossum (*Didelphis virginiana*), were sent to me by Mr. L. O. Howard, from the U. S. Dep. of Agriculture collection. Though distinct, yet it is very closely related to *P. irritans*, and might easily be confused with that species.

Pulex irritans, Linn.

1746. Linnæus, Faun. Suec. 2nd Ed., No. 1695.

This nearly cosmopolitan flea I have received from Mr. S. C. Dundore, of Lakeside, Cala., and through Mr. L. O. Howard, from Azura, Cala., at both of which localities it is common.

(TO BE CONTINUED.)

NOTES ON SOME REARED HYMENOPTERA, LARGELY PARASITIC, AND CHIEFLY FROM OHIO.

BY F. M. WEBSTER, WOOSTER, OHIO.

Elachistus ohioensis (MS.), Ashmead.—Reared from pupæ, in which stage it probably passes the winter; found November 7th, within the shells of beech-nuts, the kernels of which had been attacked and eaten by some kind of larva which had burrowed out these kernels, leaving only a mass of excrement. A hole in the shells indicated an attack similar to that of some species of *Balaninus*, though, as I found no larvæ of them, it was impossible to learn their exact nature. Locality, Wooster, Ohio.

Cirrospilus flavicinctus, Riley.—This was described in Lintner's First Report as being reared from *Bucculatrix pomifoliella*, Clemens, in Missouri, and also New York. My rearings were from *Aspidisca splendoriferella*, Clem., the cocoons of which were collected near Cleveland, Ohio.

Aphidius chenopodiaphidis (MS.), Ashmead.—This was reared from an Aphid found on the leaves of *Chenopodium album*, Linn., collected in the vicinity of Cleveland, Ohio, June 29th.

Isocratus vulgaris, Walker.—This and an undetermined *Apanteles* were reared with the species next following.

Lysiphlebus salicaphis, Fitch.—Reared August 24th from Aphid on Wahoo, *Euonymus atropurpureus*, Jacq., near Wooster, Ohio.

Pachyneuron aphidivora, Ashmead.—Reared from Aphid on leaves of *Liriodendron tulipifera*, Linn., collected in Bennett Woods, Cincinnati, Ohio, June 29th.

Rhaphitelus maculatus, Walker.—This was reared from *Scolytus rugulosus*, Ratz., burrowing in the trunks and larger limbs of fruit trees in Northern Ohio.

Praon coloradensis, Ashmead.—Reared from an Aphid on Gladiolus, August 8. Locality, Cleveland, Ohio.

Elasmus nigrescens, Ashmead.—Reared from cocoons on leaves received from Warren county, Southern Ohio. The leaves appeared to have been attacked by Fall Web-worm, though none of these caterpillars were present. Date of emerging, September 17.

Eulophus tricolaus, Prov.—Reared from mines of *Tischeria malifoliella*, Clem., in leaves of apple, received from near Schenectady, N.Y.

Segnipiesis nigrifemora, Ashmead.—Reared from the same host as the preceding species, and from the same locality, but from another lot of leaves.

Microgaster xylinoides (MS.), Ashmead.—Found, dead, in fold of leaf of Linden; Wooster, Ohio, October 15, 1894. The fold had been made by some leaf-folding larva, and extended along one of the lateral veins of the leaf.

Habrocytus aulacis (MS.), Ashmead.—Reared from stems of *Lactuca canadensis*, Linn., collected near Lodi, Ohio, October 26, 1894.

Spilochalcis torvina, Cresson.—This was reared from the rather conspicuous cocoon, which is dingy-white banded with black. Have collected similar cocoons in Tensas Parish, Louisiana, and also in Indiana. These were from near Cleveland, Ohio.

Rhodites spinosa, Ashmead.—(Described only from the galls.) Both sexes were reared from spiny galls on rose, growing along the edges of woods in Huron county, Ohio. Females emerged in the fields on May 11, and the males followed within a few days. Collected and reared May, 1894.

Amblynotus iowensis, Ashmead.—This was reared from a mass of grape leaves, affected by Phylloxera and collected along the shore of Lake Erie, near Cleveland, Ohio. From the same leaves a considerable number of *Hemerobius occidentalis*, Fitch, were also reared.

The determinations were made by Mr. W. H. Ashmead.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

VIII. THE HALIPLIDÆ AND DYTISCIDÆ OF ONTARIO AND QUEBEC.

The above-mentioned families of carnivorous water beetles are taken up here by request of the Editor and Committee, because of the great difficulty most students of Coleoptera, especially if they are beginners, find in identifying any of their captures in these groups, or even in separating the species with approximate accuracy. It is to be feared that with many it will prove difficult to follow the tables herewith presented; but they have been made as plain as circumstances will allow, and care has been taken to follow the best authorities in the selection of characters supposed to mark the respective species, so that by diligent attention to details the user of the paper may hope to co-relate his collection with our lists.

The HALIPLIDÆ which may be considered first, includes a small number of beetles easily recognized by the very convex body, narrowed and often pointed before and behind; in colour yellowish, with numerous black spots on the thorax and elytra. The antennæ are ten-jointed, situated on the front before the eyes, glabrous and filiform; the legs are slender, not fitted for vigorous swimming, the hind coxæ furnished with broad plates, contiguous internally, which conceal the posterior legs at their basal half, and from three to six ventral segments. These little creatures, which, from their peculiar spotted appearance, suggest aquatic lady-birds, may be found very commonly during the summer in ponds where plant life abounds, especially Algæ. On account of their feeble swimming power they are easily captured by raking the mass of vegetable matter on to the bank, when the beetles, on crawling out to regain the water, may be secured.

Only two genera are represented in Canada: *Haliphus*, which has the elytral interstices punctate and the last joint of the palpi small, subulate, and *Cnemidotus*, without interstitial elytral punctures, the terminal palpal joint conical, longer than the third. The species are difficult to define; the following characters, however, are those accepted as specific by Mr. Crotch, in his "Revision."

HALIPLUS, Latr.

A. Thorax without basal impression; larger species.

b. Head with bilobed black spot on the vertex; elytral striæ not deeper at base (.15 in.).....*cribrarius*, Lec.

- bb. Head unspotted; punctures of elytral striæ finer towards apex.
 Thorax with black spot anteriorly (.13-.14 in.)... *triopsis*, Say.
 Thorax immaculate (.16 in.)..... *fasciatus*, Aubé.
- AA. Thorax with an impressed plica on each side near the base; smaller species.
 Pale ochreous yellow; punctuation stronger, thoracic plica shorter (.11-.12 in.)..... *ruficollis*, DeG.
 Fulvous; punctuation less strong, thoracic plica longer (.12 in.) *longulus*, Lec.

CNEMIDOTUS, Er.



FIG. 5.

Our two species are easily distinguished from those of *Haliplus* by the thorax being ornamented with two black basal spots. Mr. Crotch unites under the name *12-punctatus* (fig. 5) the two forms which have been separated on these characters:

- Hind coxæ with a prominent angle on the hind margin (.15 in.)..... *12-punctatus*, Say.
 Hind coxæ without this angle (.16 in.)..... *muticus*, Lec.

The next family, the DYTISCIDÆ, is separated with ease from the *Haliplidæ* by the following characters: the body is usually much less stout and convex and more obtuse at the ends; the antennæ are eleven-jointed, usually filiform, though occasionally somewhat clavate or thickened at middle, inserted under the front behind the base of the mandibles. The posterior coxæ are large, reaching the sides of the body, but not covering the ventral segments. Legs natatorial, ciliate with long hairs. From the *Carabidæ* they may be known by the structure of the hind coxæ mentioned above.

All the species are more or less strictly aquatic in habit, and are as a rule strong swimmers. They may be found in numbers in ponds and water courses, sometimes being seen under the ice after the approach of winter. At night they fly around and are often attracted by lights. Some of the more northern forms, especially of *Agabus* and *Hydroporus*, may be taken under wet moss, or beneath stones or boards which have been lying on the grass in marshy places. The sexual modifications in the family are very interesting, the males often possessing a peculiar modification of the anterior (and less frequently the middle) tarsi, whereby the basal joints are dilated into a more or less cup-shaped surface, which is studded beneath with little stalked disks. The number of these disks in

connection with their arrangement and relative size, together with the extent and form of the dilatation of the tarsi, furnishes excellent characters for the separation of groups, and will be referred to again later.

The larvæ are aquatic and carnivorous, in form elongate, cylindrical or fusiform, the head large and flat, the antennæ frontal, the mandibles falcate, suctorial. The legs are terminated by two claws, and the abdomen lacks the tracheal branchiæ seen in the *Gyrinidæ*. They remain in the water until full growth is attained, when they repair to some convenient place under a board, stone or tuft of vegetation, where probably by the squirming motions of the body a cell is made in which the change to pupa takes place; the length of time spent in this latter stage must vary greatly in different broods and with the various species, but it was found to be ten or eleven days in the case of *Dytiscus verticalis*, of which a larva, taken at Bayfield, Wis., pupated on July 18th, the beetles appearing on the 28th.

The *Dytiscidæ* do not offer that diversity of form, colour and sculpture presented by many of the families of terrestrial beetles, hence the selection of easily seen, though superficial, points on which groups might be set apart has not been found practicable, and it has been considered wise to use in the main the structural differences proved useful by such workers as Drs. Sharp and Leconte in the primary divisions. Though the discrimination of the genera and species will sometimes be difficult for the beginner, it is hoped that at least in most cases a correct identification will be the reward of careful work with sufficient material. The two great divisions of the family, as defined by Dr. Sharp, are these:—

1. Metathoracic episternum not reaching the middle coxal cavity (fig. 6a).....Dytisci fragmentati.
2. Metathoracic episternum reaching the middle coxal cavity (fig. 7b).Dytisci complicati.

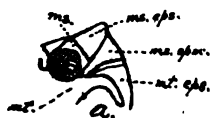


FIG. 6.

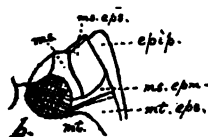


FIG. 7.

Of the accompanying cuts, fig. 6 a represents a diagram of a portion of the under surface of *Laccophilus*, which belongs to the fragmentati, *cc* being the middle coxal cavity. It will be seen that the mesosternal epimeron (*ms. epm.*) articulates at its inner end with the metasternum (*mt.*), and thus cuts off the metasternal episternum (*mt. eps.*) from the coxal cavity. In fig. 7 b, however, which is a diagram of similar parts of *Colymbites* of the complicati, the mesosternal

epimeron does not articulate with the metasternum, and thus allows the episternum of the latter to reach the cavity. These features are not, as a rule, difficult to make out from specimens, and form the basis of the modern classification of the family. Both figures, which are taken from Dr. Sharp's memoir, are lettered alike, *ms.* being the mesosternum proper, *ms. eps.* its episternum and *epip.* the epipleura. Of the Dytisci fragmentati only one genus is recorded in the Canadian list, *i. e.*:

LACCOPHILUS, Leach.

This includes two species from the fauna under consideration, both of which are rather small, very active beetles of ovate form and pale colour, in which yellowish or testaceous predominates. They separate thus:

Larger (.24 in.), head, thorax, legs and under surface testaceous; elytra dark, with the margin and four submarginal spots (subhumeral, median, post median and subapical) yellowish, also with three irregular yellowish basal marks and a narrow sutural line.....*maculosus*, Germ.

Smaller (.20 in.), pale; elytra with the subhumeral mark of *maculosus*, the others confused.....*proximus*, Say.

The Dytisci complicati form the bulk of the Canadian fauna in this family, and may be conveniently divided into four tribes as follows, in order to avoid a long and complicated synoptic table:

A. Prosternum deflexed between the front coxæ, front and middle tarsi four-jointed or apparently so, small species Hydroporini.
AA. Prosternum not deflexed; tarsi distinctly five-jointed.

b. Front tarsi of males with three* basal joints dilated, forming an oblong or elongate surface Colymbetini.

bb. Front tarsi of males dilated so as to form a rounded or triangular disk.

Posterior pairs of spiracles large, transverse; ♂ anterior tarsal disk rounded, the cupules of unequal size. Posterior tarsi with two nearly equal claws except in *Hydaticus*..... Dytiscini.

Posterior pairs of spiracles small, anterior tarsi of ♂ forming a subtriangular disk having four rows of small, equal cupules. Hind tarsi with one claw or very unequal claws..... Cybistrini.

*There are only two in *Agabinus*,

Of the above-mentioned tribes the *Hydroporini* contains nearly all of the small species, and can be treated only with considerable difficulty, as the genera are distinguished by structural characters not always evident without the destruction of a specimen. After some practice, however, the facies will be found a tolerably reliable guide. The genera may be known by these characters:

A. Small (.06 to .07 in). First ventral connate with hind coxæ.

Form rounded, robust *Desmopachria*.

Form oblong, depressed *Bidessus*.

AA. Larger (usually over .10 in.) First ventral free.

b. Scutel distinct *Celina*.

bb. Scutel invisible.

Elytral ligula* distinct, abrupt *Cælambrës*.

Elytral ligula wanting.

Mesosternum not attaining metasternum *Deronectes*.

Mesosternal fork connected with the intercoxal process of the metasternum *Hydroporus*.

DESMOPACHRIA, Bab.

D. convexa, Aubé, is a small species (.07 in.), rounded and convex in form, and of a shining brownish-red colour without markings. The elytra are finely punctured, the clypeus with distinct margin. I find it here in small creeks or ditches through meadows.

BIDESSUS, Sharp.

Contains two small Canadian beetles of depressed, oblong form and brownish colour, sometimes with paler markings. The thorax and elytra have a common basal striola on each side.

Nearly unicolorous, punctuation fine (.06 in.). *affinis*, Say.

Brownish, elytra with paler shades and coarse punctures (.06 in.) *fuscatus*, Cr.

CELINA, Aubé.

The Canadian records give *C. angustata*, Aubé, as an inhabitant of the region, possibly in error, as the genus is characteristically southern. It is a parallel, elongate insect of a brownish-red colour, the elytra darker, mucronate. The thorax is transverse, gently rounded on the sides, the disk with fine punctures, which become deep in front and on the sides near the base (.14 in.).

*This is a tongue or raised process on the under surface of the elytra near the outer margin. They must be lifted to show it.

CÆLAMBUS, Thom.

Several species belonging to this genus may be known by the presence of a ligula on the inferior surface of the elytra near the extero-posterior angle; it seems to render possible a more perfect fitting together of the elytra and the ventral segments and may easily be seen by raising the wing-case. In colour most of the *Cælambi* are pale above with more or less distinct black markings. Beneath the body is convex, sometimes much so.

- A. Body beneath rufous, very convex. Head and thorax rufous, elytra brownish, or with distinct irregular pale markings (.12 to .13 in.).....*inaequalis*, Fabr.
- AA. Body black beneath, less convex.
 - b. Larger (.20 to .22 in.), deeply or coarsely punctate. Colour variable.....*impressopunctatus*, Schall.
 - bb. Smaller (.11 to .17 in.).
 - c. Thorax hardly narrower than elytra. Piceous; head, feet and thorax testaceous, the latter infusate at base and apex (.11 in.).....*turbidus*, Lec.
 - cc. Thorax distinctly narrower than the elytra.
 - Oval, convex, testaceous above, elytra with fine and coarser punctures intermixed (.13 in.).....*ovoideus*, Lec.
 - Longer, less convex, piceo-testaceous above.
 - Thorax and elytra hardly infusate (.15 in.) *patruelis*, Lec.
 - Thorax infusate at middle, elytra at apex (.17 in.)
.....*nubilus*, Lec.

DERONECTES, Sharp.

The two *Deronectes* recorded from the Canadian fauna are densely punctured, opaque pubescent insects. They separate thus:

- Oblong-ovate, legs, antennæ and body beneath rufous, thorax with front margin, base and two large basal spots black, elytra with six or seven more or less interrupted and confluent vittæ (.17 in.).....*depressus*, Fabr.
- Elongate-ovate, black above and beneath, legs and antennæ red, elytra greenish-black, with or without many narrow, more or less confluent vittæ (.18 in.).....*griseostriatus*, DeGeer,

HYDROPORUS, Clairv.

A large genus, difficult to deal with on account of the similarity of several of the species and of the difference in the sculpture, which shows itself occasionally in the two sexes. The annexed table of the Canadian species is in the main a translation of the necessary portions of Dr. Leconte's arrangement of the genus in the Proc. Phil. Acad., 1855, with such changes in the names as will bring it into accord with our present lists:

A¹. Oblong-elongate, glabrous, thorax with basal impressed striolæ, the whole base transversely depressed, sides forming an angle with the elytra. Clypeus not margined. Colour above ochreous, head with one, thorax with two fuscous marks, elytra each with six linear vittæ and two submarginal spots fuscous (.17 in.)

.....*alpinus*, Payk., var. *12-lineatus*, Lec.

A². Oblong-ovate, moderately convex, confusedly punctate, pubescent; sides of thorax forming an angle with the elytra, hind angles rectangular, clypeus truncate, colour rufo-testaceous, elytra with black fasciæ (.17 in.).....*hybridus*, Aubé.

A³. Oblong, less convex, pubescent; elytra strongly punctured, with two smooth narrow lines on each side, clypeus rounded; above black, head and elytral fasciæ testaceous (.13 in.)...*striatopunctatus*, Mels.

A⁴. Oblong, usually obtuse in front; thorax not or hardly forming an angle with the elytra, which are without smooth lines.

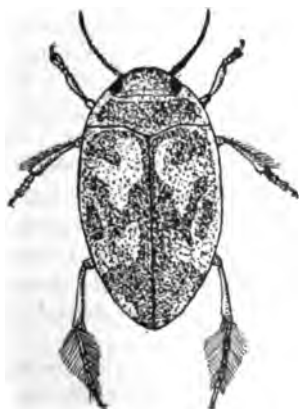


FIG. 8.

b. Pubescent; thorax regularly evenly punctured.

c. Clypeus rounded, broadly margined. Colour ferruginous, thorax blackish at base and apex, elytra with black fasciæ.

Thorax finely margined (.18 in.).....*consimilis*, Lec.

Thorax broadly margined (.17 to .18 in.) (fig. 8)...*undulatus*, Say.

cc. Clypeus rounded, not margined.

d. Colour ferruginous, elytra black, with yellowish spots or vittæ.

e. Elytral spots forming transverse fasciæ, thorax blackish at base (.18 in.)...*spurius*, Lec.

- ee. Elytral spots linear, subconfluent.
 Thorax infusate at base and apex (.18 in.)
 *sericeus*, Lec.
 Thorax not infusate (.08 in.)... *vittatipennis*, G.&H.
- eee. Elytra black, margin and two vittæ on each testaceous.
 Thorax dark at base and apex (.16 in.)... *vittatus*, Lec.
- dd. Black or blackish above, sides of elytra often rufescent.
 f. Punctuation indistinct.
 Sides of prothorax oblique (.20 in.)... *modestus*, Aubé.
 Sides of prothorax rounded (.21 in.)... *notabilis*, Lec.
- ff. Punctuation distinct (.16 in.)... *niger*, Say.
- bb. Pubescent or glabrous; thorax unequally punctured, disk often nearly smooth.
- g. Thorax hardly margined at the sides.
 h. Sides of thorax not forming an angle with the elytra.
 More elongate, sub-parallel (.16 in.)... *americanus*, Aubé.
 Broader, pointed behind, more obtuse in front (.16 in.)... *dichrous*, Melsh.
 More ovate, humeral angles pale (.15 in.)... *signatus*, Mann.
- hh. Sides of thorax forming an obtuse angle with the elytra.
 Black, sparsely pubescent (.14 in.)... *caliginosus*, Lec.
 Pubescence wanting (.12 in.)... *tristis*, Payk.
- gg. Thorax conspicuously margined at sides.
 Pubescent, black, feet rufo-piceous (.17 in.)... *tenebrosus*, Lec.
 Glabrous, rather broad, thorax very faintly punctulate, elytra faintly punctate (.14 in.)... *stagnalis*, G. & H.
 Glabrous, still broader and shorter, thorax nearly smooth, elytra more sparingly and strongly punctate (.14 in.)... *oblitus*, Aubé.
- bbb. Glabrous, thorax equally punctate; ferruginous, elytra black with testaceous fasciæ, thorax broadly infusate at apex, body beneath piceous black (.14 in.)... *concinus*, Lec.
- A⁵. Elongate, obconic, glabrous, elytra piceo-testaceous, coarsely punctate, clypeus rounded not emarginate, male antennæ dilated at middle.
 Punctuation mixed, fine and coarser (.20 in.)... *oblongus*, Steph.
 Punctuation uniform (.25 in.)... *difformis*, Lec.
- A⁶. Sub-ovate, convex, finely pubescent, clypeus broadly emarginate at middle; yellowish testaceous, finely punctured, elytra piceous with lateral spots (.09 in.)... *mellitus*, Lec.

NEW HAMPSHIRE TENTHREDINIDÆ.

BY ALEX. D. MACGILLIVRAY, ITHACA, N.Y.

The new species described below were contained in a collection of saw-flies recently received from Mrs. Annie Trumbull Slosson, and were collected on Mount Washington and at Franconia, New Hampshire. The collection was of interest on account of the number of species it contained which are evidently related to a boreal fauna.

Macrophya mixta, n. sp.—♀ Black, with the following parts white: two spots on the clypeus, the labrum, a spot on each mandible, two spots on the occiput pseudocaudad of the ocelli, a narrow line on collar and tegulæ, the anterior coxæ at apex and a narrow line at side, the middle and posterior coxæ at apex, the trochanters, the distal halves of the anterior femora, the anterior tibiæ beneath, the knees of the middle legs, the middle tibiæ beneath, the posterior tibiæ with a band at middle, all the tarsi except the base of the first segment and the apices of the others, a large spot on the posterior coxæ, two spots on the caudal margin of the basal plates, and a narrow margin on basal plates at side; costa and stigma black; lanceolate cell closed; clypeus emarginate; third segment of the antennæ twice the length of the fourth; head coarsely punctured. Length, 8 mm.

Habitat.—Mount Washington and Franconia, New Hampshire.

This species is related to *flavicoxa*, Nort., but readily separated by having the posterior femora wholly black.

Macrophya nidonea, n. sp.—♂ Black, with the following parts white: the clypeus, labrum, a spot on each mandible, the eighth and ninth segments of the antennæ, the collar, the scutellum, a narrow transverse band on the metathorax, the apices of all the coxæ, the trochanters, a spot on each of the posterior coxæ, the basal third of the posterior femora, the posterior tarsi beyond the middle of the basal segment (their apices are fuscous), abdominal segments two to five above and below (the following segments are blackish-piceous), and a small dot near the apices of posterior tibiæ above; first segment of the antennæ but little longer than second, third and fourth subequal; costa pale, stigma black; lanceolate cell closed. Length, 8 mm.

Habitat.—Franconia, New Hampshire.

Near *trisyllabus*, Nort., but readily recognized by the almost wholly black posterior femora and tibiæ.

Macrophya Slossonia, n. sp.—♀ Black, with the following parts yellowish-white: the labrum, clypeus, the mandibles, a triangular spot beneath the antennæ, a lunate spot beneath the eyes, a dot at the upper angle of the eye, a spot on the sides of the collar, the scutellum, a spot above the posterior coxæ, all the tarsi, and the sides of the basal plates; the following parts are rufous: the three basal segments of the antennæ within, antennal segments eight and nine, the tegulæ, the anterior coxæ before, the anterior femora except a black line above, the anterior tibiæ, the middle femora slightly at apex in front, the middle tibiæ, the basal half of the posterior tibiæ, the costal margin of the wings, the stigma in front, and abdominal segments three to five; third segment of the antennæ about one-third longer than the fourth; inner spur of anterior tibiæ bifid; claws emarginate; eyes strongly converging at base, not reaching the base of the mandibles; clypeus deeply emarginate; a fuscous dot in the second submarginal cell; lanceolate cell with a short, straight cross-nervure. Length, 9 mm.

Habitat.—Franconia, New Hampshire.

Dedicated to Mrs. Annie Trumbull Slosson. This is nearest *bifasciata*, Say, but has the posterior femora wholly black.

Taxonus borealis, n. sp.—♀ Black, with the following parts white: the clypeus, labrum, the mandibles except at apex, coxæ, trochanters, tegulæ, the collar with a narrow margin, and venter except apical segment and the sheaths of the ovipositor; the following parts are rufous: abdominal segments two to five above except at sides where they are marked with a large round fuscous spot, occupying most of the side of each segment, the legs except the parts above named and the apices of the middle tibiæ, the apex of the posterior femora, the apex of the posterior tibiæ and the posterior tarsi entirely; the head shining black, polished; the lateral sinuses deep, reaching the back of the head; the clypeus deeply emarginate; the labrum acutely rounded; the antennæ short and slender, the third segment twice the length of the fourth; the thorax and pleuræ shining, polished; wings hyaline, costa and stigma at base, white; stigma black at apex; veins black; posterior wings with two middle cells. Length, 7 mm.

Habitat.—Mt. Washington and Franconia, N. H.

Tenthredo redimacula, n. sp.—♀ Rufous, with the following parts black: a transverse spot at the ocelli, another just above the base of the antennæ, connected each side by lines which extend from the vertical spot

to the base of the clypeus in the lateral sinuses, thence along the base of the clypeus and the pseudorsal margin of the mandibles to their pseudo-caudal side, the occiput, the prothorax except a small spot on the apex of the collar, a spot at the apex of the median lobe of the mesothorax, the side lobes entirely except a small portion at middle, the pectus, the pleuræ except an oblique spot at middle, the sutures of the metathorax, the basal membrane, the caudal margin of the basal plates, abdominal segments one to three, the venter except at apex, the anterior coxæ, the anterior trochanters except beneath, the middle coxæ except beneath, the middle trochanters, the middle femora narrowly at apex and at base above connected by a fuscous line, the middle tibiæ with a line above on apical half, the posterior coxæ at base and apex, the posterior trochanters, the posterior femora and tibiæ with a line at base and apex above, and the stigma except at base; the following parts yellow: the clypeus, labrum, the mandibles, a spot above the posterior coxæ, the sides of the basal plates, the anterior femora and tibiæ, and the middle and posterior tibiæ before; the legs except parts named, reddish-yellow; clypeus emarginate; costa rufous, subcosta black; veins rufous; third segment of the antennæ twice the length of the fourth. Length, 12 mm.

Habitat.—Mount Washington, New Hampshire.

This species is closely related to *diluta*, Cress.

Tenthredo nigricollis, Kirby. — ♀ Black, with the following parts white: the labrum, the clypeus, mandibles, segments six to nine of the antennæ, a spot above the posterior coxæ and a spot on the sides of the basal plates; the four anterior tibiæ and tarsi testaceous; wings yellowish hyaline; nervures brown; costa yellowish, stigma black; collar black. Length, 12 mm.

Habitat.—Hudson's Bay Territory (Kirby), Mount Washington, New Hampshire.

This species is related to *grandis*, Nort., and *antennata*, Kirby, but it has the collar black.

Tenthredo basilaris, Prov. — ♀ Black, with the following parts yellowish-white: the clypeus, labrum, the mandibles except apex, which are ferruginous, the cheeks, a dot at the summit of the eyes, the tegulæ, collar above, a spot above the posterior coxæ, the sides of the basal plates, the apical half of the anterior coxæ, the trochanters except a black spot above, and the anterior femora and tibiæ in front; the following parts are

rufous, the basal segments of the antennæ, the legs except the parts named, the base of the anterior coxæ, the middle and posterior coxæ, a spot at the base of the middle femora above, the apex of the posterior femora and tibiæ, and the abdomen except the basal plates; clypeus emarginate; the eyes strongly converging below; third segment of antennæ about one-fourth longer than the fourth; stigma at base pale. Length, 12 mm.

Habitat.—Franconia, New Hampshire.

This species is nearest to *ruficolor*, Nort., but differs in having the apex of the posterior femora black above.

Tenthredo frigida, n. sp.—♂ Black, with the following parts yellowish-white: clypeus, labrum, the mandibles except tips which are rufous, cheeks, tegulæ, collar, a spot above anterior coxæ, a line on pleuræ, a spot above posterior coxæ, a narrow margin to the sides of the basal plates, the prosternum, the pectus, the anterior coxæ, the anterior trochanters, and femora except a black line above; remainder of legs rufous except a black line above on the middle femora and the posterior trochanters and a black spot at the base of the posterior femora above, and the apices of the segments of the posterior tarsi black; the abdomen except the basal half of the first segment, rufous; costa rufous, stigma black; veins black; clypeus emarginate; third segment of the antennæ one-third longer than fourth; front deeply hollowed out between the eyes; eyes strongly converging below. Length, 10 mm.

Habitat.—Mount Washington, New Hampshire (Mrs. Slosson); Olympia, Washington (Trevor Kincaid).

This species is related to *rubella*, Cress., but differs in having the four anterior femora with a black line above.

Tenthredo pallicola, n. sp.—♀ Black, with the following parts yellowish-white: the labrum, clypeus, the mandibles, the cheeks as far as the middle of the eye, the front below the antennæ, a narrow margin on the inner side of the eye as far as their posterior margin, the collar, tegulæ, a broad oblique band on the pleuræ, the ventral margin of the pronotum, the posternum, the pectus at middle, a spot above the posterior coxæ, all the coxæ and trochanters, the basal half of the anterior femora, and the middle and posterior femora at base; the following parts are rufous: the remainder of the anterior and middle femora, tibiæ, and tarsi, the posterior femora and tibiæ at middle, the apical segment of the posterior tarsi, and the abdomen beyond the basal plates, except the sheaths

of the ovipositor which are black; the apical third of the posterior femora, the extreme base and the apical third of the posterior tibiæ, and the posterior tarsi entirely except the apical segment, black; antennæ black; the third segment twice the length of the fourth; the basal plates finely margined with fuscous white at sides; the wings hyaline, the costa and base of the stigma rufous; veins brownish. Length, 11 mm.

Habitat.—Mount Washington, New Hampshire.

Readily separated from *pallicoxa*, Prov., by wanting the black lines on anterior legs and in having the three basal abdominal segments rufous.

Tenthredo barnstonii, Kirby.—♂ Black, with the following parts white: clypeus, labrum, the mandibles except apex, palpi, the four anterior femora and tibiæ in front, and a spot above the posterior coxæ; the inner spur of the anterior tibiæ bifid; the following parts rufous: the apical segments of all the tarsi, and the abdomen, except the basal plates and the first segment; the basal plates entirely and the first abdominal segment except a diamond-shaped rufous mark at middle, its long axis being transverse, black; the four anterior tarsi are paler before but not nearly so light as the tibiæ and femora; costa and stigma at base testaceous; clypeus emarginate; third segment of antennæ twice the length of the fourth; wings hyaline. Length, 9 mm.

Habitat.—Hudson's Bay Territories (Kirby), Mount Washington, New Hampshire.

This species is related to *tricolor*, Nort., and *occidentalis*, Cress. From the former it is separated by having the middle femora pale beneath, and from the latter by having the abdomen black at base and rufous at apex.

Tenthredo remota, n. sp.—♀ Black, with the following parts yellow: the clypeus, labrum, the mandibles except at apex, the cheeks, the tegulæ, collar, a curved mark above the anterior coxæ, a spot above the posterior coxæ, the basal membrane, the sides of the basal plates and their posterior margin very narrowly, the coxæ at apex, the trochanters, except a black spot above, the anterior and middle femora and tibiæ except a black line above, the anterior tarsi, the middle tarsi except fuscous spots on the apices of the segments, the posterior femora at base beneath slightly, and the apical segment of the posterior tarsi; abdominal segments one to three black, the remainder rufous; eyes strongly converging at base; third segment of the antennæ about one-third longer than fourth; costa and

stigma black, paler at their juncture; marginal cross-nervure strongly bowed, received by the third submarginal cell at its apical two-thirds; inner spur of the anterior tibiae with an oblique prolongation on the side. Length, 13 mm.

Habitat.—Franconia, New Hampshire.

Closely related to *barnstonii*, Kirby, from which it is separated by having the collar and tegulae yellow.

IN REPLY TO MR. HULST.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

Mr. Hulst has been at the pains of taking a sentence of mine as the text of a discourse as to the value of genitalic characters in classification, in the January number of the CANADIAN ENTOMOLOGIST. Whether this sentence will really bear the edifice Mr. Hulst has erected upon it, is a matter which hardly concerns me. Before either Mr. Smith or Mr. Hulst wrote, I had pointed out the value of the genitalia in generic groupings, in this following Lederer, as an accessory character. My opinion had been (but this is only an opinion) that morphologically the characters drawn from the male anal appendages were of similar value to those drawn from the antennae. I either did not hear, or had forgotten, Prof. Fernald's unprinted paper on the classification of the Tortricidæ. As I took the greatest interest in Prof. Fernald's studies, it is more than probable I did not hear it. If the sub-family *Phycitinae* can be divided into two groups or tribes from a decided modification of the genitalia, I think there would be no objection to its use, except that the character is difficult of verification. I would ask Mr. Hulst how he comes to classify species, of which he only knows the female, with such certainty in his paper? But this and other questions as to Mr. Hulst's classification are a matter for M. Ragonot to consider, and those who especially interest themselves in the study of the *Phycitinae*. My sentence has another origin and meaning which I will illustrate. During a visit Mr. Smith paid me on Staten Island, he pointed out to me that the legs of our *Catocala* were differently spined in the different species. I had not observed this. Shortly afterwards we had a new paper by Mr. Hulst on *Catocala*, illustrated by Mr. Smith, in which the species were strangely jumbled on the strength of this character. In fact, Mr. Hulst went so far as to count the number of spines on the joints to found his divisions. [Compare Bull. Brook. Ent. Soc., III. and VII., 31.] In the American Naturalist will be found a

notice, by Dr. Packard, of this paper, which I almost lack the patience to discuss. Now, after the extended work of Mr. Smith upon the genitalia of the Noctuidæ, comes Mr. Hulst with his genitalic sub-families of the *Phycitina*. This is what I meant by Mr. Hulst's "mission."

And now as to the *Pyalidæ*. The student will find that, in proposing the group or sub-family *Epipaschiina* (*Epipaschiæ*), in 1878, I gave a long comparison of the structure (always excepting the genitalia) on page 685 of the U. S. Geol. Survey, Vol. IV. Therefore, although I emphasize the character of the peculiar development of the male antennæ, I did not then base my new group on this character alone, which Mr. Hulst now erroneously charges me with doing (p. 11). May I ask Mr. Hulst why, in his subsequent paper on this group in Ent. Am., he credited its creation to Lord Walsingham? I am glad to be able to refer to my paper of 1878, in which I, for the first time in America, gave full details with figures of the structure of genera of the *Phycitina* (*Phycidæ*), always excepting the genitalia. On page 692, l.c., I define this group quite fully, and draw attention to the peculiar structure of the female frenulum, a character which I did not find mentioned by my predecessors. I gave abundant generic details, with figures of the neurulation, which I recapitulated a little later in the American Entomologist. May I ask what Mr. Hulst means when he says of these papers that I made "no progress"? In the pages of the Brooklyn Entomological publications will be found Prof. Fernald's revision of Mr. Hulst's synonyms in the *Pyalidæ*. To have redescribed Walker's irrecognizable species is no reproach, but Mr. Hulst has even gone into other families for his "new species," and Mr. Ragonot calls his method of describing—I think, correctly—"haphazard." As to this sort of work, I think I may repeat Mr. Hulst's question: "Is it scientific?" Had Mr. Hulst not repressed my work, and I think entirely misrepresented it on the *Phycitina*, giving my titles away to others, it is probable that I never would have penned my text to his sermon. And had his work in descriptive entomology been of a different nature, I should have had no legitimate doubt as to the value of his structural observations.

CORRESPONDENCE.

MUNCHAUSEN SUBSTANTIATED.

On one occasion when that illustrious and voracious traveller, Baron Munchausen, was pursuing the enemy into the gate of a fortified town, the portcullis dropped and cut off the hinder part of his horse. Heated by the conflict and the routing of the enemy, he rode to a tank to give the faithful animal some water. The horse drank like the parched earth after a six-months' drought, until the Baron finally looked around and saw the mutilation, and found that as fast as the horse drank, the water ran out of his sliced-off body, and that his thirst would probably never be slaked.

The universal verdict of the reading public for many years has placed Munchausen high upon the long list of writers whose tales are more interesting than true, and yet physiologists tell us that in the simple narrative which I have just briefed the Baron was one of the first to voice a great physiological fact. That is, that while thirst is felt in the mouth and throat, it is in reality a general craving of the whole system, and that no amount of water in the mouth alone will prevent an animal from dying of thirst.

Now, as Munchausen was ahead of his generation as a physiologist, why should we not more patiently search in his works for other truths? Just as we have our investigators and expert interpreters of hidden meanings in Shakespeare and Browning, and the Wagner music dramas, why should not societies be formed for the investigation and interpretation of Munchausen?

All this, however, is theoretical and suggestive, and introductory to the statement that I know of a chain of facts which resemble Munchausen's horse-decorpitation story, and briefly and without further plea, the facts are these:

There is a genial little caterpillar which disports itself among the leaves of the Washington shade trees in the month of August, and which is known to its select circle of acquaintances as the fall web-worm. There is also an enterprising green bug of predatory instincts which is called the soldier-bug, and which, afflicted with as strong and persistent a thirst as that of a Kentucky colonel, seeks continually to assuage it by drinking the blood of the fall web-worm. In this gory pursuit, however, the soldier-bug has a strong rival in the wheel-bug, who, if the former is compared to the Kentucky colonel, must be likened for thirst to the Georgia Judge—the

Washington variety. The interests of these two cheerful creatures conflict. Their sanguinary occupations lead them to the same hunting-ground, and sometimes there are not worms enough to go round.

On such an occasion as this a soldier-bug, awaking early with a bad headache and a tremendous desire for a cocktail, found a solitary web-worm, inserted his beak into the wriggling body, as one would put a straw into a brandy smash, and began to suck. At this moment a wheel-bug discovered the pair, and stuck his beak into the back of the soldier-bug, and also began to suck.

There was the soldier-bug in precisely the situation of Munchausen's horse. As fast as he sucked the blood of the caterpillar, it was sucked out of him by the wheel-bug. The observer's sympathy for the web-worm was lost in admiration for the pluck of the soldier-bug and in sorrow for his predicament, until both admiration and sorrow were overcome by the brilliant thought that in this observation was Munchausen substantiated.

CIMEX.

BOOK NOTICE.

"AMERICAN SPIDERS AND THEIR SPINNING-WORK.—A Natural History of the Orb-weaving Spiders of the United States, with Special Regard to their Industry and Habits: By HENRY C. MCCOOK, D. D., author and publisher, Philadelphia, Vols. I. to III., 1889-1894."

It is with pleasure that the nature-loving public congratulates Dr. McCook on the completion of his self-imposed and heroic task,—not alone of five years' duration, but more nearly of twenty-five. The author started out five years ago to give to the world a work on spiders, and he has not only done this, but has also given us a model of patient, conscientious and unprejudiced labour that will stand as a monument to its author long after he has himself laid down his pen and passed to the unknown beyond; he has given to the observer in whatever department of natural science, a standard which he may well follow. Purity, both as to observation and conclusion, is stamped on every page. It is as if he had plunged his cup into the clear, cool mountain stream and handed us, direct, a refreshing draught of the crystal waters. He has evidently not studied spiders in his pulpit, but if there is any other place that he has visited, and whence he has not brought back some

original observation on these wonderful creatures, as portrayed in his work; I do not now recall it. He has interested himself in their love affairs, and, though not officiating, has been present at their weddings; has gone into the home of Madam Spider and told everything he saw there,—how she cares for her young with a tenderness that is almost human, and treats her poor husband in a manner decidedly the reverse; how they secure their food and protect themselves and their young from their enemies;—in short, he has gone into every phase of spider life and given us a simple record of all that he saw, at the same time not forgetting to call attention to the works of others, and give strict credit for all that they have done, a sure indication of honesty and sincerity of purpose. That the work is, to an extent, imperfect, and, perhaps, defective, the author does not hesitate to admit, but there is everywhere shown a commendable desire to reduce these defects to a minimum, and few could have done as well. Had the author chosen to consult his personal comfort and financial interests, he would never have undertaken the task, which, from first to last, was of necessity a labour of love, the financial loss being only compensated for by the thanks of his fellow-workers, and the knowledge that, with his pen and pencil, he has done more than have any others of his countrymen, to further our knowledge of this most interesting group of organisms.

The first volume treats particularly of snares and nests; the second volume considers the cocooning industry, maternal instincts and general habits; the third volume contains six chapters of natural history descriptions, while the remaining and major portion is devoted to descriptions of the Orb-weaving fauna of the United States. The work contains over 1,200 pages, illustrated by 853 uncoloured figures, drawn from life, and many of them being full-page illustrations; 40 lithographic plates, on which are engraved 913 figures, coloured by hand from nature, and a full page engraving of Prof. Hentz, the father of American Araneology.

The work should find its way into every public and educational library, and especially the latter, while the individual who possesses himself of a copy will treasure it carefully and part with it only of necessity.

F. M. W.

Mailed March 8th, 1895.



NEMEOPHILA PETROSA, WALK. AND VARIETIES.
PLANTAGINIS, L.

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No. 4.

VARIATION IN NEMEOPHILA PETROSA AT LAGGAN IN WESTERN ALBERTA.

BY THOMAS E. BEAN.

At 5,000 feet altitude, in the vicinity of Laggan, *Nemeophila petrosa* flies during July. This is one of our commoner moths, and appears to be the only bombycid of common occurrence in the district. Although occasionally found near timber line, it is rare at that elevation. Under natural conditions only one flight occurs in the season, and larvæ from eggs of that flight hibernate principally at an early stage. In the house, with a warmer night temperature, larvæ resultant from the July flight will go to imago late in October instead of hibernating. In the wild environment, a second flight is prevented by the low night temperature. *Petrosa* frequents moist banks, ditches, margins of old roads, and open ground well supplied with plants. A great majority of the individuals seen in flight are males, the disparity in relative number of males and females observed resulting from the quieter disposition of the females. The males are very restless and readily take flight, thereby attracting observation. The females, less demonstrative, fly but little and are seldom noticed. Males, the physiologists kindly inform us, are katabolic, and females anabolic; we may discover, unaided, that the terminology is diabolic. Results obtained by bringing to imago a large number of wild larvæ and pupæ indicate that the females of *Petrosa* somewhat outnumber the males. The larva is a general feeder, thriving on aster, strawberry, or grass, and extremely partial to the newly formed pupa of *Nemeophila petrosa*.

The plate which this notice is intended to explain and supplement has been prepared under the skillful supervision of Mr. H. H. Lyman. Selection of specimens for the purpose proved a difficult matter, on account of the necessary limitation to a single plate of twenty figures. Complete illumination of the subject would require at least five plates. Were such ample resources of illustration available, three of the plates would serve to present effectively the principal sequence of pattern

evolution, by displaying a progressive series of minute gradations of pattern; a fourth plate might be devoted to an accessory suite of specimens illustrating subordinate lines of variation; and on the final plate an interesting series of aberrant examples could be presented in an order suggestive of their systematic relationship. Five plates, so managed, would furnish a pictorial analysis of the pattern-building method of *Petrosa* more instructive than a laborious essay.

Limited to twenty figures, I found it advisable to select a set of examples suitable for a merely synthetic plate, indicating the leading results of the pattern development rather than its progressive details. The plate contains figures of eleven *Petrosa* males, and seven females. A somewhat fuller series of variations could have been shown by figuring only males. By selecting partly females, however, a distinct advantage was gained, as I have included four appropriate examples bred from one lot of eggs, and incidentally a direct proof is thereby supplied that the plate represents in its local specimens a single valid species. Numbers 1 to 9, inclusive, also 11 and 16, are males. Numbers 12, 13, 14, and 17 to 20, inclusive, are females. For comparison, two instances of *Nemophila plantaginis* are included, numbers 10 and 15. The former is a male, form *Hospita*, from northern Finland; the latter a female, from the Amour region in eastern Siberia.

My analysis of *Petrosa* is based on examination of 199 males and 160 females. The series is as complete as can be desired, comprising all specialties and stages of pattern caught or bred during seven collecting seasons. The entire material was first assorted in an order expressing the gradual modification of pattern, beginning with initial "*Scudderi*," and progressing to ultimate "*Petrosa*." In order to estimate in numerical terms the prevailing tendency or present attitude of the moth as to pattern, the extended column of variation has been sectioned into separate masses, thus distributing into convenient sections the pattern-distance between the two extremes of variation.

One hundred and seven flown males are first considered. Section 1 contains 14 of these specimens, which, as to upper surface at least, are formal *Scudderi*. Fig. 1 of the plate differs from the specimens of section 1 merely in having the light coloured spur (which extends from base of f. w. and is a rudiment of the longitudinal stripe of *Petrosa*) extended to greater length; in other respects it is *Scudderi*. Fig. 7 has this basal spur as in *Scudderi*.

Section 2 contains 16 intergrades very close to *Scudderi*. Some are like fig. 1 of the plate, some have the longitudinal stripe of f. w. prolonged nearly to a junction with the oblique bar, a few have slightly developed light markings on hind wing. In several examples the oblique bar on f. w. is largely produced, and on basal side projects a branch backward toward the systematic point of junction with the longitudinal stripe, although this stripe is only developed to the extent of a short basal spur. In section 3 are 20 intergrades near to *Scudderi*, but having usually a well defined light pattern on h. w., as in figures 3 and 7 of the plate. Section 4 comprises 7 very characteristic intergrades nearer to *Scudderi* than to *Petrosa*. Fig. 5 stands for this section, and is nearer than the rest of section 4 to the character shown in section 3. The other 6 specimens in section 4 appear to form a progression in pattern of h. w. away from fig. 5 in the direction of *Petrosa* (fig. 16). This progress, however, does not consist of sharply defined gradations like the h. w. pattern steps seen in figures 8 and 4, which figures so normally lead toward fig. 16. In the progression formed by these 7 specimens, the h. w. black area, extending in fig. 5 from the central white band to the base of the wing, becomes in the other specimens increasingly indefinite and finally nebulous, as if the black were eliminated atom by atom without any definite pattern evolution. In the 7th term of this progression, the h. w. is practically like that of fig. 2, except that the basal part of the wing, in addition to the two black streaks seen in fig. 2, has also a slight haze of black scales. This 7th term, however, is not as to f. w. a typical *Petrosa*, for the longitudinal stripe is extremely tenuous at its end next the oblique bar. In the other 5 specimens the longitudinal stripe is scarcely more developed than in fig. 5 of the plate. Section 5 has 10 intergrades, very uniform, decidedly nearer to *Petrosa* than to *Scudderi*. They come between fig. 11 and fig. 8, but nearer the latter. Section 6 is formal *Petrosa*, consisting of 41 specimens. Figures 2, 6 and 16 exemplify this section, fig. 16 being the dominant local form. In section 6 variation is subordinate to a general equality or maturity of pattern.

Sections 1, 2 and 3 are not in the slightest degree distinct in a systematic sense. Together they number 50 individuals, constituting the form *Scudderi* with its inseparable variations. Section 4 agrees in system with the previous section, but between the two masses there is an appearance of discontinuity. In case fig. 5 and another specimen were

lacking, a rather broad gap between sections 4 and 3 would result. Even in that case, the systematic unity of pattern would remain evident. Section 5 accords entirely in system with section 6, yet it happens that actual intergrades between them are extremely scarce, so that these two bodies of variation are also nearly isolated from each other. The only intermediates between sections 5 and 6 are figures 8 and 4 and a single additional specimen; all three are bred specimens—"missing links" are not always so easily obtained.

Sections 5 and 4 are not visibly harmonic. Between them exists a break of continuity by lack of intergrades, and this break resembles a systematic partition, from the fact that the methods of pattern growth in the two series appear discordant. Although the section 5 pattern is more like formal *Petrosa* than is the pattern of section 4, yet a higher stage of the method of section 4 reaches practically the *Petrosa* pattern without in transit assuming the section 5 pattern, or so it seems. It is a fact that section 5 shows more plainly its alliance with sections 2 and 3 than with section 4, while section 4 more clearly manifests its alliance with section 6 than with section 5. Yet sections 4 and 5 undoubtedly belong in the relative positions mentioned. Study of the males alone does not relieve this apparent discord. The males matured indoor from estray pupæ, or from larvæ found wild and fed up, have not supplied any examples reconciling this lack of harmony. I have bred two considerable families from eggs, but it has singularly occurred in each instance that all the resulting males belong on the "*Petrosa*" side of this gap. Figs. 11 and 16 were from one lot of eggs, and although they are a good distance apart as to pattern advancement, yet they are plainly identical in method, fig. 11 being intergraded with fig. 16 by figs. 8 and 4, as also by section 5 and by some other specimens. Study of the females supplies convincing evidence that this apparent lack of harmony at one point in the series of flown males is not due to a systematic partition. In the series of females no corresponding discord is found. Also, we have in figures 12 and 17 direct evidence uniting the extremes of the general series. These two females were bred from the same lot of eggs which produced figs. 11 and 16. Fig. 12 is almost normal *Petrosa*. Fig. 17 may safely be considered a very moderate divergence from formal *Scudderi*. These two females efficiently unite the extreme terms of the series. The lack of unity between sections 4 and 5 is due mainly to the fact that there is a meagerness of representation at that part of the series of males. The

principal masses of individuals occur near the extremes of the pattern-distance, and the intermediate position is in comparison thinly occupied. A divisive attitude is manifested.

Additional to the flown males, my series contains 74 males matured in the house from estray pupæ or wild larvæ. Of these, 13 are *Scudderi*; 11 are intergrades very near *Scudderi*; 15 are somewhat more divergent, yet pretty near to *Scudderi*. One is a stage agreeing with section 4 of the flown males; 6 are nearer to *Petrosa* than to *Scudderi*, and intergrade closely with fig. 11 of the plate and with section 5 of the caught males, 5 of them being intermediate between fig. 11 and section 5, and the other 1 between section 5 and fig. 8 of the plate. Twenty-eighty are formal *Petrosa*. These 74, then, distribute as to pattern development in about the same numerical proportions as the caught males, and with a similarly feeble representation at the centre of the pattern-progress as compared with the extremes.

The caught females are but 25, all told. Of females matured in the house from wild larvæ and estray pupæ, there are 111. Total number of females, not including those bred from the egg, 136. Of these, 16 are *Scudderi*, 20 are intergrades very near *Scudderi*, 26 are more divergent, yet all pretty near to *Scudderi*; 9 are of composite pattern, combining in the same individual a considerable degree of *Petrosa* character, as to some parts of the pattern, with a predominant *Scudderi* tendency in other pattern elements; 9 are well-balanced intermediates between *Petrosa* and *Scudderi*; 18 are gradations near to *Petrosa*; 38 are formal *Petrosa*.

The females display a pattern sequence more even and harmonic than that of the males, with less tendency to break into divisions by lack of intergrades, and more fully sustained in the central part of the chain of variation. At the same time, the females vary as extensively as the males, and they exhibit at least an equal amount of aberration and as great a degree of inequality or oscillation in the progress of the several pattern constituents.

All through the range of variation, in both sexes, it is conspicuously evident that *Petrosa* is exceedingly unstable in regard to the relative development of the various elements of pattern. This is sufficiently illustrated in figures 3 and 5, also by figs. 9 and 11. The oblique bar of primary is the only element which approaches fixedness. The f. w. cell-



spot may be very small or very large, and may be isolated, joined to the oblique bar, or connected with the longitudinal stripe. The longitudinal stripe of f. w. is peculiarly vacillating. Sometimes it shows large development in an otherwise very dark wing, as seen in figs. 3 and 9; on the contrary, in some patterns it is but a mere basal spur, although the other light elements are highly conspicuous, as in fig. 5.

In the summer of 1888 three families were bred from eggs.

Progeny in family A. :

Males.—5 formal *Petrosa*; fig. 16 of the plate is one of them. One intergrade, somewhat nearer to *Petrosa* than to *Scudderi* in the method of its pattern, but at least as near to *Scudderi* as to *Petrosa* in degree of development of pattern; this is fig. 11 of the plate.

Females.—3 nearly formal *Petrosa*; fig. 12 is one. Ten intergrades, all nearer to *Scudderi* than to *Petrosa*, of which the one nearest to *Scudderi* is fig. 17 of plate.

Progeny in family B. :

Males.—One, formal *Petrosa*. Two, near *Petrosa*. Six, a little nearer to *Petrosa* than to *Scudderi*, and all much alike.

Females.—One, nearly formal *Petrosa*. Seven, a little nearer to *Scudderi* than to *Petrosa*, and all much alike. Three, nearly *Scudderi*.

Family C.—Eggs from a female of extreme *Petrosa* characters. Resulting progeny, 3 composite males, *Scudderi* as to hind wing, but with f. w. approximating *Petrosa* nearly in equal degree to the f. w. of fig. 11. Two of them are precisely the form "*Geometrica*," as figured in Plate 2, Proc. Ent. Soc., Phil., Vol. 4, 1865. The third specimen differs by having a single small white dot on each hind wing.

A question has been raised whether *Nemeophila plantaginis* occurs in North America. At Laggan, *Plantaginis* is not found. The local *Petrosa*, throughout its immense range of variation, is at no point of its pattern-sequence coincident with *Plantaginis*. Of the latter I have compared a small but broadly geographical series. The typical *Plantaginis* from Saxony is a larger form than our moth of the Bow Valley, and is besides a far more gorgeous affair, with hind wing black and red in the ♀, black and saffron in the ♂. The type form from polar Norway is smaller, but retains nearly the same pattern, and in my examples the colours are but little toned down. From northern Finland I have a pair,

representing still the typical form, but with the brilliancy of the colours greatly reduced; these are smaller than most local *Petrosa*, and the ♀ is not more brightly coloured, but the ♂ has the tawny yellow ground of hind wing, never found here in male *Petrosa*. From Saxony, from polar Norway, and from northern Finland, I have the male form *Hospita*, in which the saffron or tawny yellow ground of h. w. is replaced by white; this form approaches the local ♂ *Petrosa* by a practical concord of colours. Fig. 10 of the plate represents *Hospita* male from northern Finland. *Hospita* is the nearest phase of *Plantaginis* to the Bow Valley *Petrosa* male. Fig. 15 represents my only Asian instance of *Plantaginis*, a ♀ from eastern Siberia, an example nearer of kin to the Laggan *Petrosa* ♀ than any other *Plantaginis* I have seen. One local female corresponds so closely to this Amour *Plantaginis* that they are separable by a single character only. This final point of distinction is the apical element of the light pattern of primary, the light coloured marking near apex of f. w., exterior to the oblique bar. The apical element seems to be persistent in *Plantaginis*, but in the local *Petrosa* it is only occasionally seen, and even when present is in most cases rudimentary in degree. Fig. 14 illustrates an extreme development of *Petrosa*, in which the apical inscription is blended with the oblique bar. Even in extreme stages of the *Petrosa* pattern the apical element is usually absent. It appears sometimes in intergrades very near to "*Scuderi*." Occurrence or lack of this character, and the degree of its development when present, appear not to be correlated to the degree of advancement of the general pattern. The extensive material before me strongly supports the view that *Petrosa* and *Plantaginis* are distinct species.

Aside from the two *Plantaginis* figures, the plate represents a single species. This conclusion is derived from examination of the caught series, and independently proved in the families bred from eggs.

NOTE.—As the Entomological Society of Ontario supplied the plate, Mr. Bean generously presented the specimens from which it was made to the Society's collection.

H. H. L.

PREPTOS, TAMPHANA, AND AROTROS.

In the February number of the CANADIAN ENTOMOLOGIST, Mr. Dyar very justly complains of the inadequacy of my descriptions of the above genera in the Proceedings of the Zoological Society of London, for 1892. Both Preptos and Tamphana belong to the Eupterotidæ. Preptos is most closely allied to the Eastern genus *Tagora*, Walk., and differs in the following particulars:—Primaries with veins 5 and 6 from upper angle of cell, discocellulars angled outwardly and then inwardly close below vein 5; secondaries with discocellulars very oblique. No allied forms of *Preptos oropus* have as yet been discovered in America, although the species has been redescribed as *Tagora corax*. Druce, Proc. Zool. Soc., London, 1893.

Tamphana is allied to *Tarchon*, Druce and *Apatelodes*, Packard, but the wing shape and lateral abdominal tufts distinguish the genus at once, and I shall give full details of the neurulation in a paper I am preparing on Walker's American types at Oxford. Arotros belongs to the Bombycidæ; the neurulation only differs from *Bombyx*, Hubn., in having vein 8 of the secondaries rise from the cell at a third of its length from the base, but the shape of the wings is quite different. In locating the above genera I follow the arrangement of Mr. Hampson, as Messrs. Neumoegen and Dyar place the Bombycidæ under the group of families with a frenulum, whereas *Bombyx*, the typical genus, has no frenulum.

W. SCHAUS, Twickenham, England.

THECLA ONTARIO, EDW.

In a small collection of butterflies sent to me for identification, I find a good example of this very rare Hair-Streak, which was taken by Mr. William Metcalfe, of Toronto, at Grimsby, on 24th of June, 1894. This record is important, as it is the first one of an exact date and locality. Mr. Metcalfe states that the exact spot was along the Grand Trunk Railway track, near Grimsby Park, at the back of Mr. Harry Griffith's farm. The specimen in question is a male in good condition, although slightly stained with cyanide on the upper side. The figure given by Mr. W. H. Edwards (in his Butt. N. America, I., pl. 2, *Thecla*) represents this specimen admirably, although slightly larger. Mr. Metcalfe's specimen expands 22 mm., and has the orange spot on secondaries above only faintly indicated by a few rusty scales.

J. FLETCHER.

ON THE TERM CYDOSIINÆ.

BY A. RADCLIFFE GROTE, A. M., BREMEN, GERMANY.

In my check list, New York, May, 1882, I first proposed the collective term *Cydosiinæ*, having for its sub-family type the well-known *Cydosia nobilitella*. I associated with it *Penthetria*, Hy. Ed., not from any study of this genus, unknown to me in nature, but merely on the strength of certain of Mr. Edwards's remarks. This latter genus, under the name *Tantura*, Kirby, is now referred to the *Lithosiidæ* by Neumoegen and Dyar, and probably correctly. I excluded the genus *Oeta*, previously referred here, as I believed it to belong to the *Tineidæ*, as indicated by Zeller. To this sub-family *Cydosiinæ*, Grote, the genus *Cerathosia* is also referred by Neumoegen and Dyar, following Smith's more recent opinion. In 1882, I regarded *Cydosia*, then, as the type of a sub-family of arctiiform *Zyganidæ*. In 1893, Dyar regards it as the type of a sub-family of zygæniiform *Arctiidæ*. This is the amount of the difference; but, in any event, I may point out that the term *Cydosiinæ* belongs to me. And I do not expect that the last word as to its family position has been said. In his Preliminary Catalogue, CAN. ENT., XXI., 169, Mr. Smith refers the genus *Gnophaela* to the *Arctiinæ*, p. 172. This genus, according to Neumoegen and Dyar, belongs to the *Pericopidæ*. The genera, previously regarded by me as arctiiform *Zyganidæ*, following Dr. Packard, under the term *Glaucoptes*, are now divided into two families: *Zyganidæ* and *Pericopidæ*, excluding the *Cydosiinæ*. For the genera, referred by me to the *Castniaræ*, the distinct family *Agaristidæ* is retained. This seems to be the amount of the difference. In any event, I point out the fact that, up to quite recently, Dr. Packard had not abandoned his view of the family solidarity of his family *Zyganidæ*, and that this certainly was not the case in 1882; hence any criticism of my list, based on more recent discoveries, is totally irrelevant. On the contrary, my list offers a term *Cydosiinæ*, of which the most recent classification (1893-4) avails itself. Further, Mr. Smith refers, in 1889, *Melanchroia* to the *Arctiinæ*. No one else, I believe, has ever placed it there, nor has it stayed there long. This placing of *Gnophaela* and *Melanchroia* among the *Arctiinæ* might indeed provoke an unfriendly criticism, but a little reflection shows that all such mistakes are in due course corrected as we add to our knowledge of structure. Already in 1891 the two genera suddenly

disappear from the *Arctiinae*, to appear in the *Pericopidae* of the Philadelphia List. In the next List to be published it seems likely that *Melanchroia* will submit, with similar celerity, to a third *changement de place*.

As to the position of *Cerathosia*, Dr. Packard says: "The occurrence of such [glandular] hairs in this genus [*Cerathosia*] is interesting, from the fact that they have not yet been observed in the Arctians, to which this moth has been referred, nor in the *Noctuide*, among which it should be placed, since no Arctians have, when hatched, smooth glandular hairs." Proc. Bost. S. N., Hist, xxv., 109, 1890. The citation of this genus in a synoptic table does not of itself constitute a proof that it is correctly classified.

SOME NEW ATTIDÆ.

BY NATHAN BANKS, SEA CLIFF, N.Y.

Phidippus borealis, nov. sp.

Length, 13. mm.; ceph., 4.2 mm. long, 3 mm. wide. Cephalothorax very dark brown, covered with black hairs, clypeus with white hairs, and some white scales on the lower sides; a bunch of stiff hairs behind the eyes of second row; mandibles red-brown, iridescent greenish near tip; sternum brown with black hairs. Abdomen black, a narrow basal line of white, and broad side stripes of white which do not quite reach to the tip; just beyond the middle the side stripes indent the central black area; sides black and venter blackish; legs black, bases of metatarsi reddish. The cephalothorax is moderately high, narrower than in the allied species, the quadrangle wider behind, the anterior row much curved, the S. E. small and well separated from the M.E., the eyes of second row almost twice as near to the lateral as to the dorsal. The posterior metatarsi are more slender than usual, and spined only at tip. The region of the epigynum is nearly circular in outline, with a deep rounded excision behind, and two quite widely separated openings in the anterior portion. Two females; Crawford Notch, White Mts., N.H. (Mrs. Slosson). Differs from allied species (*rufus*, *mystaceus*) in the narrower cephalothorax, markings of abdomen, etc.

Dendryphantes bifida, nov. sp.

Length, ♂, 4 mm.; ceph., 1.8 mm. long, 1.2 mm. wide; ♀, 4.2 to 5 mm. long. Cephalothorax reddish, black around eyes, some long white hairs on clypeus; mandibles red-brown; sternum dark brown or black; legs yel-

lowish, femora mostly black in the male, anterior legs of female reddish, patellæ and tibiæ of other legs reddish or with red bands. Abdomen red-brown, in male with four black spots each side near tip, in female a black stripe each side with three pale spots, as in *D. flavus*, sometimes a pair of pale spots near base; venter pale with three dark brown or black stripes. In structure similar to *D. flavus* and *D. montanus*, but the mandibles are not enlarged as in those species, and the size is much smaller. The male palpus is similar to *D. montanus*, but with a smaller tibial hook, a smaller striate upper portion of bulb, and with a tube yet stouter and deeply bifid at tip. The epigynum has a triangular excision behind, and a deeply lunate dark patch in front. Several specimens; Olympia, Washington (T. Kincaid).

Attus dorsatus, nov. sp.

Length, 3.5 mm.; ceph., 1.5 mm. long, .95 mm. wide. Cephalothorax red brown, eye-region blackish, a narrow median light stripe extending from the dark of eye-region to the hind margin of the cephalothorax, also a light stripe each side from just below the dorsal eyes to the hind margin, a few whitish hairs around anterior eyes, abdomen above and below a uniform gray, sternum and legs brownish yellow, latter with ends of the joints darker, mandibles reddish. Cephalothorax but little shorter and narrower than the abdomen, barely wider behind the eye-region than in front, eye-region as wide behind as in front, eyes of second row a little nearer dorsal than lateral eyes. Fourth pair of legs much the longest, first the next; tibia IV. twice as long as III., anterior coxæ separated by more than width of lip; metatarsi IV. spined throughout. The epigynum consists of a depressed area, broadly rounded in front and longer than broad, at the anterior end there are two square holes, and from them extend behind on each side a clavate body, enclosing between their tips two elongate holes. One specimen; Southern California.

Attus morosus, nov. sp.

Length, 4.5 mm.; ceph., 2.1 mm. long, 1.4 mm. wide. Eye-region blackish, thoracic part reddish, a median white line; dorsum of abdomen brown, a pair of large black spots on anterior part, on the anterior edge of each is a small white dot, behind them there is a broad, triangular, transverse area of white with three brown chevrons, a large black spot each side terminating the two posterior chevrons, behind them is a white band and a narrow black band just above the spinnerets; sides lined

with brown and white ; venter pale, with a large light brown spot ; sternum blackish, pale on the margins ; legs brownish, paler at tips, posterior pair indistinctly ringed. Cephalothorax as usual, quadrangle of eyes equally wide in front and behind, eyes of second row half-way between dorsal and lateral eyes. Fourth pair of legs much longer than third ; anterior coxæ separated by more than width of lip ; metatarsi IV. spined throughout. The epigynum consists of a circular depressed area, divided by a broad septum, much broader behind than in front, where on each side there is a small dark spot. One female ; Olympia, Washington (T. Kincaid).

Icius obliquus, nov. sp.

Length, 2.8 mm.; cephal., 1.2 mm. long, .8 mm. wide. Cephalothorax yellowish-brown, eyes connected by a black band, extending behind and enclosing the dorsal eyes, a few of the radial furrows partly black, margin black ; abdomen yellowish, a few brownish chevrons near the tip, sides with oblique blackish lines, venter suffused with black, two rows of yellow spots ; sternum yellowish, black on edge ; legs yellowish-brown, anterior pair stoutest and darkest, with a few black patches, palpi similar, mandibles yellowish, black near base. Sides of cephalothorax almost straight, slightly narrowed behind ; eye-region wider in front than behind ; eyes of second row about half-way between dorsal and lateral eyes. Anterior coxæ separated by more than width of lip ; fourth pair of legs longest, third nearly as long as first ; the three pairs of spines on tibia I. are very long, metatarsus IV. spined only at tip. The tibia of palpus has no projection, the lower part of palpal organ is large, the upper portion is cut off from that below by a transverse furrow and is twice as wide as long ; the tube is slender, but slightly curved and projects into a large circular cavity in the upper portion of the tarsus. One male and one young female ; Olympia, Washington (T. Kincaid).

Icius monticola, nov. sp.

Length, 4 mm. ♂. Cephalothorax red-brown, black on margin and in eye-region, clothed with white scales ; a median row of stiff bristles just above anterior eyes. Legs yellow-brown, the femora darker ; on posterior pairs a black ring at base of tibia, metatarsus and tarsus ; clothed with long black hairs and shorter white scales ; palpi red-brown, clothed with white scales ; sternum dark red-brown ; abdomen blackish (but somewhat discoloured), clothed above with white scales, and below with fine hairs. Cephalothorax moderately long, low and flat, broadest in

middle, eye-region one and one-half times as wide as long, equally wide in front and behind; the A. M. E. large, nearly touching, the eyes of second row a little nearer to A. S. E. than to dorsal eyes. Mandibles small and weak; sternum narrow; anterior coxæ separated by more than width of labium; leg I. barely longer than leg IV.; femora, patella, and tibia enlarged; metatarsus IV. spined only at tip. Palpi short, the tarsus truncate at tip, tibia with a short straight-pointed projection on outside, lower part of palpal organ very much swollen, almost pointed, upper part short, tube short, bent upon itself. A male; near Livermore, Colo. (C. F. Baker.)

Icius minutus, nov. sp.

Length, 2.5 mm.; ceph., 1.1 mm. long, .75 wide. Cephalothorax red-brown, eye-region black, abdomen dark gray, with a few narrow light chevrons on the posterior part; legs white, annulate with black, the femora partly suffused with fuscous, sternum dark gray, venter pale, a median and two broader lateral gray stripes, palpi white, distal joints a little enlarged, mandibles yellowish. Cephalothorax widest behind the middle, eye-region a trifle narrower behind than in front, legs short, fourth pair wanting, third as long as the first, second shorter, anterior coxæ separated by more than width of labium. Abdomen one and one-half times as long as the cephalothorax. A quite prominent bristle arising from between anterior median eyes. The epigynum has, in the posterior portion, two very large contiguous circular depressions; and two very much smaller holes, slightly separated, in the anterior portion. One female; Olympia, Washington (T. Kincaid).

Icius floridanus, nov. sp.

Length, 3 mm. Cephalothorax dark yellow-brown, darker in eye-region, clothed with yellowish or golden scales, especially near eyes; mandibles yellowish; sternum blackish. Legs pale yellowish with a black stripe on anterior and one on posterior sides of patella, tibia and metatarsus, anterior femur blackish, rest of anterior leg reddish, with the usual black stripes. Abdomen black, with a band of white scales at base, above with dark, somewhat coppery scales, below with white hairs. Cephalothorax quite short and broad, sides but little rounded, low and nearly flat, eye-region nearly twice as wide as long, a little wider behind than in front; eyes of second row closer to lateral than to dorsal eyes. Mandibles quite large, with a black tooth behind fang; sternum short, triangular; anterior

coxae separated by width of lip; leg I. longest and stoutest, but not much longer than leg IV., metatarsus IV. spined only at tip. The palpus is long and slender, a short curved spine at tip of tibia, the tarsus fully twice as long as broad, palpal organ but little convex, divided transversely and the upper part bilobed, behind one of these lobes arises the long and slender tube, which curves toward the middle and extends into a furrow in the upper part of tarsus. One male from Punta Gorda, Florida (Mrs. A. T. Slosson).

Icius similis, nov. sp.

Length, 4.1 mm.; ceph., 1.6 mm. long, 1.1 mm. wide. Cephalothorax with sides and thoracic part reddish, with a few white scales and a marginal stripe of white; eye-region black, posterior part iridescent; clypeus with white hairs; a ridge of white or yellowish hairs above the first row of eyes; mandibles, legs and sternum reddish, the latter darker than the other parts; the legs have a black stripe above and one on each side of patella, tibia and metatarsus; the posterior metatarsi are almost wholly black. Abdomen black, covered with pale scales, not or but slightly iridescent.

In structure and coloration this is similar to *I. elegans*, Hentz, but the scales are not as iridescent, there is no pale line around the abdomen of the ♀, the legs are more reddish, the ♂ has no brush to tibia I., the tube of palpus much stouter; the ♀ is but little larger than the ♂. The epigynum has a small median rounded excision in the posterior margin; and two oval holes, about their diameter apart, in front. Several specimens from Olympia, Washington, and from Ft. Collins, Colo. Prof. Emerton, in his N. Eng. Attidæ, mentions what is probably this species as a variety of *Icius elegans*.

Icius sexmaculatus, nov. sp.

Length, 3.5 mm.; ceph., 1.4 mm. long, .85 mm. wide. Thoracic part black, with some golden hairs on the anterior edge; sides and thoracic part reddish, mandibles reddish brown; sternum yellowish; dorsum of abdomen red-brown with blackish patches, and with six white spots, two transverse basal ones, two larger, median, more circular ones, and two small preapical ones; beyond the middle pair a few indistinct pale chevrons; legs pale yellowish, anterior pair more reddish, especially femora and bands on patellæ and tibiæ; palpi pale; sides of abdomen red-brown; venter pale, with a brown line each side. This species is similar to *I.*

lineatus; the cephalothorax is the same, though perhaps a trifle higher and the dorsal eyes slightly farther apart; otherwise the structure is like that species. The tibia of the palpus has a short black spine at tip, the tarsus is much narrower than in *I. lineatus* and the palpal organ quite simple, the lower part is large and projecting, the upper part striate and with a short, stout apical tube; there is on the outer side the outline of a curved tube pointing down toward the tibial spine. One male; Washington, D.C.

Saitis parvulus, nov. sp.

Length, 3 mm.; ceph., 1.4 mm. long, 1.05 mm. wide. The eye-region black; the thoracic part reddish, with two black spots on the posterior margin; the palpi and first legs black, the second legs mostly black; other pairs yellowish, no black spots as in *S. pulex*; the mandibles red-brown; the sternum yellowish-brown; the abdomen black above, with a broad white stripe, broadest at the middle, beginning just before the middle it contains five broad black chevrons; venter yellowish, with a median black spot and two black stripes. Similar to *S. pulex*, but the cephalothorax is shorter and the eye-region is proportionately broader, the quadrangle being a little narrower behind; the palpus is much smaller, the tibia has not the long, thin projection, nor a broad lobe below, but a moderate, curved black process; the bulb of palpus has a swollen part not seen in *S. pulex*. One male from a deep and cold swamp near Ithaca, N. Y.

Habrocestum borealis, nov. sp.

Length, 5.5 mm.; ceph., 3. mm. long, 2. mm. wide. Cephalothorax black, in a strong light the thoracic part showing slightly reddish; the sides with white scales, which on the margin form a distinct white line; above anterior row of eyes is a crest of long black hairs; sternum black, sometimes pale in the centre; coxæ mostly black, sometimes posterior ones pale at base; palpi black, except the tibia and tarsus, which are pale; anterior pairs of legs mostly pale, with a few black patches on femora and tibiæ; posterior legs mostly black, the tarsi pale, and the patellæ, tibiæ and metatarsi are lineated with pale. The palpi have many white hairs or scales, and on the tarsi they are interspersed with long black hairs; there are white scales on the black parts of the legs. The abdomen is jet black, sides white, above with a white basal band and a band crossing the dorsum just before the middle and curving to meet the white sides; just above the spinnerets is a pair of white dots, and in front of these a median white spot, sometimes elongate. The structure

is similar to the other species of the genus ; there is a horny spot on the base of the abdomen. The palpus is similar to *H. caecatum*, but is not so broad ; the tibial projection is much longer and the tube is not so stout. There is no projection at the tip of patella III. Several males, from Franconia, N. H. (Mrs. A. T. Slosson).

Habrocestum clypeatum, nov. sp.

Length, ♂, 4.7 mm. Cephalothorax yellowish in front, black on sides and a short median stripe from behind ; clothed with tawny scales ; a curved band of white scales just above first row of eyes, surrounding the eyes of second row and passing below the dorsal eyes and extending behind toward the posterior margin ; a stripe of white scales near each lower margin ; clypeus black, a few white hairs in centre and on mandibles, and a prominent elongate vertical spot of white scales under each side eye. Leg I. black, except metatarsus and tarsus which are pure white, clothed with white scales, those under the tibia extremely long and pedicellate ; basal joints of leg II. blackish, with white scales ; legs III. and IV. brownish-yellow, femora blackish at base, with white scales and black hairs ; sternum pale. Abdomen black above, a basal band of white and a white median stripe behind ; sides and venter pale, the latter with two black stripes. Of the usual structure of the genus, leg III. simple. Palpus broad, much like that of *H. agilis*, Bks. (*auratum*, Peck., not Hentz.), but the tibial projection is much stouter, and the long tube starts nearer to the tip of bulb. One male ; Dixon's Canon, Colo. (C. F. Baker).

Zygoballus iridescens, nov. sp.

Length, 4.1 mm. ; ceph., 1.8 mm. long, 1.4 mm. wide. Eye-region black, thoracic part reddish, both with whitish hairs and scales. Anterior femora black, black stripe above and on inner side of patella and tibia I., rest of legs pale yellowish, without any spots. Mandibles and mouth parts red-brown ; sternum black. Abdomen black, clothed above and on sides with iridescent scales and long hairs ; venter black, hairy, and with two indistinct rows of pale spots. Structure in general similar to *Z. bettini*, but the mandibles are not quite so large ; and the sternum is much broader, not narrowed in front, so that the anterior coxæ, which are not as long as in *Z. bettini*, are more widely separated. The region of the epigynum is red-brown, and is semicircular in outline ; showing four pale spots, two in front close together, and one in each posterior corner. Franconia, N. H. (Mrs. Annie T. Slosson).

SYNOPSIS OF THE DIPTEROUS GENUS PHORA.

BY D. W. COQUILLET, WASHINGTON, D. C.

In Osten Sacken's well-known Catalogue of Diptera ten species of Phora are credited to our fauna. Of these I have been unable to find any Phorid described by Fabricius under the name of *atra*. The author who first used this name appears to have been Meigen; in his *Klass. Besch. Eur. Zwei. Insect* (1804), this author describes a *Trincura atra*, but in his later work (*Syst. Besch. Eur. Zwei. Insect*, 1830) this name is relegated as a synonym of *Musca aterrima*, Fabr. (*Ent. Syst.*, 1798). In the recent revision of the Austrian Phoridae, by Strobl (*Wiener Ent. Zeitung*, 1892, pp. 193-204), no mention is made of a *Phora atra*, Fabr. The reference in the Catalogue should therefore be credited to Meigen, and transferred as a synonym of *Trincura aterrima*, Fabr.

Phora fuscipes, Macq., has been credited to our fauna by Walker, but from Macquart's three-line description it is quite impossible to identify the species, and the name should therefore disappear from our list. The form doubtfully referred to this species by Zetterstedt does not occur in our fauna so far as I am aware.

Since the publication of the above mentioned Catalogue, descriptions of five supposed new species of Phora from our fauna have been published, viz.: *aletia*, Comstock (*Cotton Insects*, 1879, pp. 208-211), and four other species by Prof. Aldrich, in the *CANADIAN ENTOMOLOGIST*, Vol. xxiv., pages 142-146. Although I have not seen an undoubted type of *Phora aletia*, Comst., still there is every reason for believing that it is identical with the common *Phora nigriceps*, Loew. The described female was evidently immature, which would account for the darker markings on the abdomen mentioned in the description; in the male, however, it is stated that the "dorsal portion of the abdomen is entirely blackish," and this accords perfectly with the colouring of this part of the body in normally coloured specimens of *nigriceps*. Moreover, this latter species has been repeatedly reared from larvæ feeding upon the decomposing chrysalides of *Aletia*, thus having similar habits to the form described by Prof. Comstock.

So far as at present known, the larvæ of all the different species of Phora feed upon animal or vegetable substances in a more or less state of decay. In Prof. Aldrich's paper mentioned above the statement is made that several of the species were reared from *Cimex* cocoons, but in a recent letter the author states his conviction that these cocoons contained only dead larvæ and pupæ at the time they were attacked by the Phorids.

Four European species, not heretofore known to occur in our fauna, have recently been recognized by the writer, viz: *femorata*, Meig., *interrupta*, Zett., *mordellaria*, Fall., and *fusciata*, Fall. There are also four apparently undescribed species occurring in this country, and these will be found duly characterized below. Our species may be tabulated as follows:

Second heavy vein of wings simple, not forked near the apex; head and body black.

Frontal setæ next the antennæ pointing downwards; tibiæ destitute of setæ on the outer side; palpi and halteres yellowish..... *cocciphila*, n. sp.

Frontal setæ pointing upward; front and hind tibiæ each bearing one, the middle tibiæ two setæ on the outer side near the base; halteres black.

Palpi and antennæ black..... *femorata*, Meig.
Palpi yellowish.

Antennæ black.. .. *mordellaria*, Fall.

Antennæ yellowish-red..... *clavata*, Loew.

Second heavy vein forked near the apex.

Middle tibiæ each bearing two or three setæ on the outer side near the base; frontal setæ pointing upward; head and thorax black.

Halteres, palpi and abdomen black; front tibiæ each bearing a single seta on the outer side near the base.

Hind tibiæ each bearing a seta on the outer side near the base and three smaller ones before the tip..... *cimbicis*, Ald.

Hind tibiæ destitute of setæ on the outer side... *pachyneuron*, Loew.
Halteres yellowish.

Palpi and abdomen black, front and hind tibiæ each bearing a single seta on the outer side near the base.... *microcephala*, Loew.
Palpi yellowish.

Hind tibiæ each bearing seven, the front ones three setæ on the outer side; abdomen black..... *spinipes*, n. sp.

Hind tibiæ each bearing two, the front ones each one seta on the outer side near the base; abdomen black.. *Luggeri*, Ald.

Hind and front tibiæ each bearing a single seta on the outer side near the base; abdomen velvet-black, the bases of the segments partly or wholly yellow..... *venusta*, n. sp.

Hind tibiæ destitute of stout setæ on the outer side, the front ones each with three or four ; abdomen black, the apices of the segments sometimes narrowly yellow . . . *incisuralis*, Loew.

Middle and other tibiæ destitute of stout setæ on the outer side, at most bearing short bristly hairs ; frontal setæ next the antennæ pointing downward.

Thorax, palpi and halteres yellowish.

Head, antennæ and dorsum of abdomen largely or wholly black. *nigriceps*, Loew.

Head and antennæ yellowish.

Abdomen yellow, a black fascia or pair of spots on the second and sometimes also on the third segment. *fasciata*, Fall.

Abdomen yellow, the sides and a fascia near the hind margin of each segment, black. *scalaris*, Loew.

Abdomen yellow, an interrupted black fascia on the base of each segment. *interrupta*, Zett.

Thorax, head and abdomen black.

Halteres black, palpi yellowish. *fungicola*, n. sp.

Halteres yellowish.

Palpi black. *minuta*, Ald.

Palpi yellowish.

Tip of first heavy vein near the last fourth of the distance between the humeral cross-vein and the tip of the first branch of the second heavy vein ; abdomen of male bristly. *rufipes*, Meig.

Tip of first heavy vein nearly midway between the humeral cross-vein and the apex of the first branch of the second heavy vein ; abdomen of male destitute of bristles. *setacea*, Ald.

Phora cornuta, Bigot, from Cuba, is too imperfectly described to admit of giving it a place in this table.

Phora spinipes, n. sp.—Black, sub-shining, the palpi, halteres, front and middle tibiæ and a large portion of their femora, also the knees of the hind legs, yellowish ; all frontal setæ pointing upward. Front tibiæ each bearing three setæ on the outer side of its basal three-fourths, middle tibiæ each bearing three setæ in a curved row on the outer side of its basal half, hind tibiæ each with seven setæ in an irregular row extending

nearly the entire length of the outer side. Wings hyaline, costal vein extending three-fourths the length of the wing, ciliate with rather short bristles; second heavy vein forked near its apex, tip of first heavy vein slightly beyond the middle between the humeral cross-vein and apex of the first branch of the second heavy vein; first slender vein curved near its base, then nearly straight, the cell in front of it scarcely wider than the narrowest part of the cell behind it; fourth slender vein distinct. Length, 4 mm. Hartford, Conn. A single specimen in my collection, taken April 30, 1893, by Mr. Stewart N. Dunning.

Phora cocciphila, n. sp.—Black, sub-shining, the under side of the third antennal joint and the palpi, yellowish; halteres whitish; front legs, including the coxæ, light yellow, the others brown. The four frontal setæ above the antennæ pointing downward, the others upward. Tibiæ destitute of stout setæ on the outer side. Wings whitish hyaline, costal vein not extending to the middle of the wing; ciliate with very short bristles, second heavy vein simple, not forked near the tip, apex of first heavy vein near the last fifth of the distance between the humeral cross-vein and the tip of the second vein; first slender vein nearly straight, the cell in front of it nearly twice as wide as the narrowest part of the one behind it. Abdomen bare in both sexes. Length, .75 to 1.25 mm. Twenty-five specimens in the collection of the Department of Agriculture, bred in October and November, 1894, from larvæ infesting dead adults of *Icerya purchasi*, collected by Mr. C. H. T. Townsend at Magdalena, Victoria, and Tamaulipas, Mexico.

Phora fungicola, n. sp.—Black, sub-shining, antennæ and halteres concolorous, the palpi and legs, including the front coxæ, yellowish. The four frontal setæ above the antennæ pointing downward, the others upward. Tibiæ destitute of stout setæ on the outer side. Wings hyaline, costal vein extending to the middle of the wing, ciliate with short bristles, second heavy vein forked near the apex, tip of the first heavy vein near the last third of the distance between the humeral cross-vein and apex of the first branch of the second vein, first slender vein gently curved its whole length, the cell in front of it scarcely wider than the narrowest part of the one behind it. Abdomen bare in both sexes. Length, 1 to 1.5 mm. Ten specimens in the collection of the Department of Agriculture, bred by T. D. A. Cockerell, Las Cruces, New Mexico, from larvæ infesting a tree-fungus, *Trametes Pecki*, which was inhabited by Coleopterous insects belonging to the genus *Cis*.

Phora venusta, n. sp.—♀ Head and thorax black, sub-shining; antennæ yellowish-brown; palpi, halteres and legs, including the coxæ, yellow. Abdomen opaque velvet-black, the broad bases of the second and sixth segments and a triangular dorsal spot at the base of the third, fourth and fifth segments, yellow; venter also yellow. Frontal setæ pointing upward. Front tibiæ on the outer side each bearing one, the middle tibiæ with two stout setæ near the base, hind tibiæ destitute of setæ on the outer side. Wings hyaline, costal vein extending to the middle of the wing, ciliate with minute bristles, second heavy vein forked near the apex, the tip of the first heavy vein near the last fourth of the distance between the humeral cross-vein and the tip of the first branch of the second vein; first slender vein nearly straight, the cell in front of it sub-equal in width to the one behind it. Length, 1 mm. Boston, Mass., Sept., 1868. A single specimen in the National Museum. I am indebted to the Curator for the privilege of studying the fine series of specimens contained in the collection of that institution.

PREPARATORY STAGES OF EUCLIDIA CUSPIDEA, HUBN.

BY JOHN B. LEMBERT, YOSEMITE, CAL.

Egg.—Pea-green colour; round, with deep longitudinal lines from the top to the bottom. Deposited in twos and threes up to as many as eight or nine at one laying before flying away. The eggs change next day to a mottled gray colour, resembling the dried plant stalks on which they are laid. They are not deposited directly on the food plants, which are lupin and clover. They hatch out in nine days.

Larva, first stage.—A slender looper. Head quite large and bilobed. Light green from the head to the first segment back of the thoracic legs, which are six in number; thence dark green to the segment joining the four abdominal legs, lighter beneath; remainder of body light green. Length, about 6 mm.

The second change escaped my notice, as the larvæ were always moving and must have taken but a short time to effect it; the whole surface of the body became concolorous and of a light green. On the twelfth day they were very quiet; fine white and black lines could be seen along the sides. After this they would raise themselves up, put their heads between the thoracical legs, then twist around, open their mouth parts as if in the act of biting or covering their bodies with a fluid; suddenly they disappeared. Seven days afterwards I examined the leaves of the food plants and found one curled up in a web; taking it for granted that it was prepared to hibernate, I put the jar away for the season.

Subsequently I found that I was mistaken on this point, and that I had introduced with some clover a Hemipterous enemy which destroyed my larva.

PRELIMINARY STUDIES IN SIPHONAPTERA.--III.

BY CARL F. BAKER, FORT COLLINS, COLO.

Genus Pulex (continued.)

DIVISION II.

Mandibles short, not reaching ends of anterior coxæ ; spines in pronotal comb, 14 to 26. Group 1.

Mandibles long, reaching to or beyond ends of anterior coxæ ; spines in pronotal comb, 16 to 20. Group 2.

TABLE OF SPECIES OF GROUP 1.

Spines in pronotal comb, 14 to 20.....A.

Spines in pronotal comb, 24 to 26 ; hind femora with a row of minute bristles on side ; first two or three abdominal segments with minute teeth on disc above ; first claspers of male without short black teeth ; bristles on second antennal joint shorter than third joint ; length, 3-3.5 mm. ; colour dark brown*avium*.

A. Abdominal segments each with one row of bristles ; eyes very large, longer than third antennal joint, the upper edge extending above middle of head ; bristle on second antennal joint reaching to end of or beyond third joint ; maxillary palpi with joint 2 shorter than 4 in male, as long as 4 or longer in female ; head in female evenly rounded from occiput to mouth, in male flat on top, rounded in front ; pronotal comb of 14 spines ; first two or three abdominal segments without minute teeth on disc above ; in anterior tarsi joint 5 is as long or longer than 1 and 2 together and longer than 3 and 4 together ; in middle tarsi joint 5 is three times 4 and as long as 2 or longer, while 2 is longer than 1 and as long or longer than 3 and 4 together ; in posterior tarsi last three joints are very slender, 5 about equal to or shorter than 3 and 4 together, 2 equals three times 4, as long or longer than 5 and longer than 3 and 4 together, while 1 is much longer than 5 and nearly three times as wide ; hind femora with a row of minute bristles on side ; colour dark brown ; length: male, 2 mm. ; female, 2.25-2.5 mm. *glacialis*.

AA. Abdominal segments each with two rows of bristles ; spines in pronotal comb, 16 to 20.....B.

B. Hind femora with a row of minute bristles on side ; eyes small, near lower edge of head ; antennal groove in anterior half of head ; in anterior tarsi joint 5 is shorter than 1 and 2 together and shorter

than 2 and 3 together, but as long or longer than 3 and 4 together; in middle tarsi joint 5 equals twice 4, equals or is slightly shorter than 2, which is shorter than 1 and shorter than 3 and 4 together; in posterior tarsi joint 2 is less than three times 4, much longer than 5, and nearly as long as 3 and 4 together. F.

BB. Hind femora without a row of minute bristles on the side; eyes small, near lower edge of head; antennal groove in anterior half of head; maxillary palpi in female with joint 2 more than three-fourths of 4; head in female evenly rounded from occiput to mouth; pronotal comb of 18 spines; colour light brown, sometimes darker dorsally. C.

C. Abdomen more convex above than below, and without teeth on discs of first two or three segments above; bristles on second antennal joint shorter than third joint; bristles on abdomen as follows: first row on each side of dorsal segments with 4 or 5 bristles, second row with 6, ventral segments with 4 on each side; in anterior tarsi joint 5 is longer than 3 and 4 together; in middle tarsi joint 5 equals twice 4 and equals 1; in posterior tarsi joint 5 equals two-thirds of 2, is less than twice 4, and equals 3, 2 is slightly less than 3 and 4 together, while 1 is more than twice 5; colour light brown; length: female, 3 mm. *Wickhami*, n. sp.

CC. Abdomen concave or very slightly convex above; with minute teeth on discs of first two or three abdominal segments above. D.

D. Bristles on second antennal joint nearly as long as third joint; bristles on abdomen as follows: first row on each side of dorsal segments with 6 bristles, second row with 7, ventral segments with 4 or 5 on each side; in anterior tarsi joint 5 nearly as long as 3 and 4 together; in middle tarsi joint 5 is less than 1, about as long as 2 or shorter, and less than 3 and 4 together; in posterior tarsi joint 5 equals two-thirds of 2, equals 3, and is less than twice 4, 2 is less than three times 4, and 1 is more than twice 5; colour light brown; length: female, 2.5-3 mm. . . . *Gillettei*, n. sp.

DD. Bristles of second antennal joint short; comparative lengths of tarsal joints not as above. E.

E. Male claspers unarmed; head evenly rounded; first and second rows of bristles on dorsum of abdominal segments each with 7 bristles; in anterior tarsi joint 5 equals 3 and 4 together; in middle tarsi joint 1 equals 2, equals 5, and equals 3 and 4 together;

in posterior tarsi joint 5 equals 2, equals twice 4, and equals one-half of 1; colour light brown; length: female, 2-2.5 mm.; male, 3 mm. *fasciatus*.

EE. Male claspers armed with short black teeth; head evenly rounded in female, flat above, rounded in front in male; first row of bristles on each side of dorsum of abdominal segments with 5 bristles, second row with 6, ventral segments on each side with 3 or 4; in anterior tarsi joint 5 as long or longer than 3 and 4 together; in middle tarsi joint 5 equals 1 or less, equals 2 or more, and equals 3 and 4 together or less; on hind tarsi joint 5 equals two-thirds to three-fourths of 2, equals twice 4, and equals 3 or more, 2 is less than three times 4, while 1 equals twice 5 or more; light brown, more or less dark dorsally on abdomen; length: male, 1.75-2 mm.; female, 2.25-2.5 mm. *Howardii*, n. sp.

F. Bristles on second antennal joint shorter than joint 3; maxillary palpi in male with joint 2 nearly as long as 4; head in male flat on top, rounded in front; pronotal comb of 18 spines; first two or three abdominal segments without minute teeth on discs above; first and second dorsal rows of bristles on segments of the abdomen each with about 7 bristles on either side, ventral rows with about 4 on either side; first claspers in male with long heavy bristles, but without short black teeth; in posterior tarsi joint 5 about equals 3, while 1 is longer than 2, longer than 3 and 4 together and more than three and a-half times the length of 5; head, thorax and legs light brown, abdomen reddish brown; length: male, 3 mm. *coloradensis*, n. sp.

FF. Bristles on second antennal joint longer than joint 3; eye very small, almost obsolete; maxillary palpi in female with joint 2 as long as 4; head in female evenly rounded from occiput to mouth; pronotal comb of 20 spines; first two or three abdominal segments with several short minute teeth on discs above; bristles on abdomen as follows: first row on dorsum of each segment with 12 to 14 on either side, second row with 11 to 12 on either side, each ventral row with about 6 on either side; in posterior tarsi joint 5 is shorter than 3, 1 nearly as long as 2 and 3 together and less than 3 and 5 together; uniform light brown; length: female, 2.5 mm. *ignotus*, n. sp.

Pulex avium, Tschb.

1880. Taschenberg, Die Flohe, p. 70.

This species has quite an appalling synonymy. Dr. Taschenberg records it from a great variety of birds, including the domestic fowl. I have four specimens from Dr. Taschenberg, taken on *Sturnus vulgaris* in Germany, and a single specimen taken at Ames, Iowa, by Prof. Herbert Osborn—the host not given. It is recorded in Bull. 30 of the Texas Exp. Sta. as “common; very troublesome last summer at Bryan, Tex., on chickens.” This determination was undoubtedly an erroneous one, the record probably referring to *Sarcopsylla gallinacea*.

Pulex glacialis, Tschb.

1880. Taschenberg, Die Flohe, p. 76.

I have received specimens of this species from Mr. A. B. Cordley, who took them on “cotton-tail rabbit,” near the Grand Canon, in Arizona. The type specimens were from *Lepus glacialis*, “collected at the North Pole.”

Pulex Wickhami, n. sp.

This species differs very widely in general appearance from any other *Pulex* I have seen. The abdomen in the two females before me is somewhat swollen and suddenly and strongly rounded back of the thorax. The swelling is not due to pregnancy, as the abdominal plates retain their normal relative position. My specimens are from *Sciuropterus volans*, and were collected at Iowa City, Iowa, by Mr. H. F. Wickham.

Pulex Gillettei, n. sp.

Closely related to *fasciatus*, though readily separated from it. Prof. C. P. Gillette took three specimens from Red Squirrel (*Sciurus canadensis*) at Portland, Mich.

Pulex fasciatus, Bosc.

1801. Bosc d'Antic, Bull. des Sci. par la Soc. Philomat. II., p. 156, No. 44.

I have seen nothing among the specimens examined that I could refer to this species as it is described and figured by Taschenberg. It was originally described from *Myoxus nitela* and *Talpa europea*. Kolenati found it on *Cricetus frumentarius*. Taschenberg records it from *Myoxus*, *Mus musculus*, *Mus decumans*, and *Canis lagopus*, in Europe, and without giving host, from Mammoth Cave, in Kentucky.

Pulex Howardii, n. sp.

I have received specimens of this species as follows: On Red Squirrel, at Ithaca, N. Y., from Mr. R. H. Pettit; on Squirrel, at Tallula Falls, Ga., from Mr. L. O. Howard (No. 5435); on "Gray or Fox" Squirrel, and in nest of field mouse, at Lincoln, Nebraska, from Prof. Lawrence Bruner; also several specimens from Prof. Herbert Osborn, at Ames, Iowa, the host not given.

Pulex coloradensis, n. sp.

The nearly parallel upper and lower borders of the abdomen in the single male before me, give it a somewhat peculiar appearance. It was taken from Fremont's Chickaree, at Georgetown, Colo., by Professor Lawrence Bruner.

Pulex ignotus, n. sp.

I have received two specimens of this species from Prof. Herbert Osborn, of Ames, Iowa. The host is not given.

[TO BE CONTINUED.]

MOUNTING INSECTS WITHOUT PRESSURE.*

BY R. W. RENNIE, LONDON, ONTARIO.

The mounting of insects (which are naturally semi-transparent) without pressure has always appeared to me to be a far more satisfactory method than the process so generally in use, viz., the soaking the specimen in liquor potassæ until clear, and then pressing it flat between two glass slips. The liquid partially, or wholly, destroys the internal organs, and the flattening process completes what the liquid failed to accomplish; that is, in so distorting the insect that the flattened skin on the slip but very remotely resembles the natural insect.

In mounting without pressure, some kind of a cell is necessary, and it can be obtained in various materials, such as ebonite, hard rubber, brass, tin, etc., but my own experience with cells of any depth cemented to the slip has been anything but satisfactory, for very often a fall, or even a slight jar, will separate the cell from the glass slip.

The cells that I use are the same that I described some three years ago at a meeting of this section, and up to the present time I have not found anything that answers all requirements so well, and yet is so easy to construct.

* Read before the Microscopical Section of the Entomological Society of Ontario.

For the benefit of those who were not present at that meeting, I will again describe the process of making :

The material used is beeswax, with a small quantity of resin added to increase the hardness and to raise the melting point. This mixture of beeswax and resin is kept heated almost to the boiling point ; if the temperature falls much lower you will not be able to form a smooth cell. Place your slip on the turntable and set in rapid motion, then with a moderately thick brush apply a drop of the hot wax to the slip, which, being cold, cools the wax rapidly, rendering the cell visible at once ; apply the wax drop by drop until the cell is a little deeper than is required for your material ; allow it to cool thoroughly, and before removing from the turntable, take a sharp knife and trim it down to the proper thickness. You may also taper the outside of the cell towards the centre and the inside towards the circumference, leaving the base of your cell wider than the top, but always have your cell wide enough at the top, so that your cover glass will not come quite to the edge, leaving a small margin for the cement ; a shallow depression may also be turned in the top to receive the cover glass. This cell answers for such mounting media as Canada balsam, or any glycerine jelly ; but for media containing oil, it will be necessary to varnish the cell inside with some material that will not be acted upon by the mounting medium. These cells answer for almost any kind of material, if treated in the manner described, but when the mounting medium is of a very thin or watery nature, it is advisable to slightly heat the slip after you have your cell made and before turning it down, in order to make a perfect contact between the wax and glass.

For mounting transparent aquatic insects, take a cell of proper depth, transfer your insect to it with a small quantity of water, and add a drop of Pyroligneous acid ; as soon as the acid reaches the insect it dies at once ; place the cover glass in position, and after carefully absorbing any water that may have run over, cement down the cover.

Semi-transparent insects should be placed in a solution of Carbolic acid and Turpentine (one part of the former to three of the latter) and allowed to remain until clear. Ordinary crystallized Carbolic acid may be used in preparing this clearing solution, but I think the best results are obtained by using the C. P. acid ; the crystals of pure Carbolic acid are needle-shaped and colourless, while the ordinary commercial acid comes in white flaky crystals. The Turpentine will also require some attention, for, as ordinarily sold, it is hardly suitable for this purpose.

Take one pint of Turpentine, and add to it about two ounces of 95% alcohol, shake thoroughly, and set aside until the liquids separate (the alcohol will be the upper liquid), remove the turpentine to another bottle (which should be quite clean), and add to it about one pint of distilled water, give another good shake, and set aside until separation takes place; the turpentine will now be on top; pour it off carefully, and add about one ounce of finely ground starch, and filter through paper; you will now have a pure and sparkling turpentine. The alcohol used need not be wasted, as it will do for cleaning slips, brushes, etc., also for burning.

After your insect has become clear in the carbolic acid and turpentine solution, remove it to a cell of proper depth, and drain off superfluous solution, arrange the wings, legs, and antennæ, add one or two drops of Canada balsam dissolved in turpentine, and apply the cover glass, remove any balsam that may have run over, and cement down the cover. If the directions given are carefully followed, you will have a mount that you can spend hours in examining; and one that will show better the internal organs, than can be done by following any other method of preparation with which I am acquainted. In this method of preparing insects, for microscopical examination, as in a great many other processes, the longest part of the process is the description.

BOOK NOTICES.

Canadian Spiders, by J. H. Emerton. Transactions of the Connecticut Academy, Vol. ix., July, 1894; 30 pp.; 4 plates.

This interesting and valuable paper treats of spiders collected in various parts of Canada, from the Rocky Mountains to the Gulf of St. Lawrence. The author states at the outset that the species differ little from those of the New England States. "Out of 61 species, from Labrador to Manitoba, 56 species live in New England; and 27 out of 48 species from the Rocky Mountains." Of the latter, no less than 40 of the species mentioned were collected by Mr. Bean at Laggan, and of these sixteen are described as new to science. Mr. Tyrrell, of the Geological Survey of Canada, supplied other species from the Rocky Mountain region, Alberta Territory, and Ottawa, and other collectors from the various localities mentioned in the paper. The plates illustrating the new species are admirably drawn by the author, the excellence of whose work in scientific illustration has long been well-known and highly appreciated.

Report of Observations of Injurious Insects and Common Farm Pests during the year 1894, with Methods of Prevention and Remedy. Eighteenth Report. By Eleanor A. Ormerod, F. R. Met. Soc., etc., etc., London: Simpkin, Marshall, Hamilton, Kent & Co., Limited, 1895, pp. 122, lxii., plate.

In this the author has given us another of her most excellent Annual Reports, if anything, better than those that have preceded it. There are 29 species, besides the two groups, Julidæ and Vespidae, fully treated in the Report, which is illustrated by 45 figures and one excellent plate, the latter devoted to the Stem Eelworm, *Tylenchus devastatrix*, in connection with its recent discovery as injurious to hops. We congratulate the author on being able to give us so much information on Eelworms, Warble Fly, and Carabid enemies of the strawberry. In fact, she has, throughout her Report, strictly adhered to the plan expressed in the preface, viz.: "not to enter again on such of our common infestations as have been repeatedly noticed in my preceding Reports, excepting where there was some new information to be given or (sometimes) needed." This renders the Report of unusual value. To do the publication justice is simply out of the question in an ordinary book notice, but suffice it to say that it is in every way a credit to its author.

The writer well remembers an evening spent with the late Fraser S. Crawford, at his suburban home near Adelaide, South Australia. We had been discussing entomology and entomologists, when he made a remark something like this: "Miss Ormerod is a noble woman, and is giving both her life and her wealth to the agricultural interests of England, and I cannot understand why she should not be better appreciated by Englishmen." The sentiment will be echoed by American entomologists, but I fear in our hurry and bustle, we forget to drop an occasional word of encouragement and appreciation, such as we ourselves would gladly receive. Working almost alone, and comparatively unaided, in a labour of love not always appreciated, it seems to me that words of encouragement from her colleagues, both in America and out of it, are but matters of justice. Other reports on Economic Entomology there are, and they come officially from the Board of Agriculture of England, but the writer has searched through them in vain for tokens of originality or just credit for the information contained in them.

F. M. W.

NOTES.

The Editor regrets to announce that the main building of Trinity College School, of which he has been Head Master for the last twenty-five years, was totally destroyed by fire on the night of Saturday, February 9th. Though the weather was intensely severe and all the boys were in bed when the fire broke out, no one was injured in any way. School-work was resumed in temporary quarters on the Tuesday morning, and in a few days a large hotel and other premises were secured, in which the boys are comfortably provided for until the work of rebuilding is completed.

The Editor desires to thank his many friends for their kind letters of sympathy, and begs that his correspondents will pardon any delay in reply to their letters, as his time is so fully occupied with other matters. Though he lost a large number of books and valuable papers, his entomological library and collections were fortunately in his private residence, which was with much difficulty saved from destruction.

We are sorry to learn that others have been less fortunate than ourselves during this disastrous winter. MR. C. H. TYLER TOWNSEND had his valuable library, which was particularly rich in works on European and American Diptera, stored in a warehouse at Las Cruces, New Mex. During his absence at Washington, the building was burned down and all his property was destroyed. He will be very grateful to any correspondents who will send him as complete sets as possible of their publications. His address is now Brownsville, Tex., where he is acting as temporary Field Agent of the Division of Entomology, U. S. Department of Agriculture. MR. J. G. JACK, of Jamaica Plain, Mass., has also sustained a very serious loss by the destruction by fire of his library and collection. We trust that those who are in a position to do so will assist in replacing them.

MR. A. R. GROTE, of Bremen, Germany, has changed his address to "39 Gartenstrasse, Hildesheim, Germany."

We grieve to record the deaths of DR. GEORGE MARX, the eminent Arachnologist, who expired at Washington, D.C., on the 4th of January, aged 56 years; and of MR. BERTHOLD NEUMOESEN, a frequent contributor to this magazine, and the possessor of a very valuable and extensive collection of Lepidoptera, who died of consumption, in New York, on the 21st of January, in the 50th year of his age.

Mailed March 30th, 1895.

The Canadian Entomologist.

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No. 5.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

IX. THE DYTISCIDÆ (COLYMBETINI) OF ONTARIO AND QUEBEC.

The Colymbetini, which follow the Hydroporini in Dr. Leconte's scheme, are immediately distinguished therefrom by the distinctly five-jointed tarsi, and also, as a rule, by the much greater size. The males have the anterior, or middle tarsi, variously modified, but not forming regularly rounded disks as in the following group. Using the characters developed by the writers, whose works have already been mentioned, we may divide the Canadian genera thus :—

- A. Semimembranous side pieces of first dorsal segment smooth.
 - b. Hind tarsi with unequal claws.
 - Black or metallic above..... *Ilybius*.
 - Ferruginous above..... *Matus*.
 - bb. Hind tarsi with claws equal or nearly so.
 - c. Last joint of palpi emarginate..... *Coptotomus*.
 - cc. Last joint of palpi normal.
 - d. Elytra deeply 10-striate..... *Copelatus*.
 - dd. Elytra not regularly striate.
 - e. Prothorax not margined; elytra with numerous very short minute longitudinal striæ.... *Agabetes*.
 - ee. Prothorax margined at sides.
 - Wing of metasternum linear, strongly curved..... *Ilybiosoma*.
 - Wing of metasternum wedge-shaped.... *Agabus*.
 - AA. Semimembranous side pieces of first dorsal rugose. Species usually large.
 - Elytra reticulate..... *Scutopterus*.
 - Elytra smooth or with short coarse lines; metasternum with deep groove..... *Rhantus*.
 - Elytra transversely strigose; metasternum with feeble groove..... *Colymbetes*.

The character mentioned above for the primary separation of the groups of genera, the sculpture of the first dorsal segment, may need some explanation. The rugosities referred to under group AA. are to be seen near the first spiracle, and to be appreciated the elytron must be raised. However, it will seldom be necessary to refer to this, if a little experience, or a few named specimens, are in the possession of the student, since the groups separate easily by their facies.

ILYBIUS, Er.

The following scheme gives, in tabular form, the difference between the Canadian species as defined by Dr. Sharp. Lacking two of them, I am unable to verify the characters :—

- A. Hind tarsi of males with the joints margined at the external lower edge.
 - b. Last ventral of ♂ not carinate, the apical portion with coarse longitudinal striæ (.46 in.).....*subæneus*, Er.
 - bb. Last ventral of ♂ with distinct median apical carina.
 - Outer claw of anterior tarsi emarginate near the base in the ♂ ; legs piceous (.45 in.).....*4-maculatus*, Aubé.
 - Outer claw of anterior ♂ tarsi simple ; legs rufous (.38 in.).....*angustior*, Gyll.
- AA. Hind tarsi of ♂ not margined at the lower external edge ; last ventral with rather short carina, hind margin obscurely rugose ; anterior feet rufous, posterior piceous (.40 in.)...*biguttatus*, Germ.

The considerable longitudinal convexity of the species of *Ilybius*, with their finely reticulate sculpture, renders them easily distinguishable from the neighbouring genera. In colour all are black above, more or less metallic, the elytra with two small pale lateral spots, one of which is sub-apical. *I. viridiæneus*, Cr., does not appear in the above table, since Dr. Sharp has placed it in synonymy with *I. subæneus*, Er.

COPTOTOMUS, Say.

C. interrogatus, Fabr., represents this genus. It is of ovate, sub-convex form, about .28 in. long, head red with black vertex, thorax reddish, black at base and apex. The elytra are brownish with pale irrorations, a short vitta near the scutellum, and the external margin irregularly yellow. The under side and legs are reddish.

ILYBIOSOMA, Crotch.

A black beetle about the length of the preceding is *I. bifarius*, Kirby. The thorax is short with rounded sides, rufescent in colour, and with broad margin. The elytra are covered with little striae, which, in

general, are longitudinal in direction, but behind the middle slope somewhat towards the suture. The front of the head and the legs are red.

COPELATUS, Er.

Here belongs *C. glyphicus*, Say, which is peculiar on account of the distinct elytral striæ. Colour rufo-piceous, legs paler. Length, .19 to .24 in.

MATUS, Aubé.

Elongate, brownish-red, thorax rounded at the sides, anterior angles acute. Length, .32 in. Easily recognized by the elongate form and peculiar colour. Our species is *M. bicarinatus*, Say.

AGABETES, Crotch.

Oblong-oval, black, beneath reddish. Thorax very short, sides rounded, lateral margin reddish; elytra with reddish humeri, the surface covered with minute short scratches. Length, .27 in. *A. acuductus*, Harr.

AGABUS, Leach.

The species of *Agabus* are very numerous, and, from their extreme similarity in some parts of the series, difficult to separate. While none of them are very large, most of them are above a quarter of an inch in length; the colour is usually blackish, often more or less metallic, rarely variegate. They may often be found under stones in wet grassy places, or around the roots of plants in marshes and shallow pools; the swimming legs are usually rather feebly developed.

It has been deemed unwise to attempt a synoptic table, several of the Canadian species not being at hand for study. We have, therefore, been content to follow in the main the arrangement of Mr. Crotch, with the addition of such species as have been described since the publication of his paper, and such changes of nomenclature as seem necessary to bring it into correspondence with recent researches. The groups are based on the form of the male claws, the females offering too few characters of value to enable them to be identified in many cases without the corresponding males. This latter sex has the anterior tarsi more or less swollen, the joints beneath being clothed with hairs usually tipped with minute disks.

Group I. Anterior external claw in the ♂ very elongate, broadly dilated, internal one elongate and sinuate.

A. erythropterus, Say. Oval, convex, black, opaque; legs, margins of ventral segments and elytra yellowish brown, the sides and humeral angles paler. Surface of elytra closely reticulate, dorsal punctures obsolete. .37 in.

Group II. Anterior external claw acutely dentate in the ♂.



Fig. 9.

A. disintegratus, Cr. (Fig. 9). Reddish, thorax blackish before and behind, elytra with narrow blackish vittæ, metasternum black. .30 in. Easily recognized by its colour.

A. tæniolatus, Harr. Resembles the preceding, but is a little larger and broader, the metasternum not black, the first joint of the middle tarsi in the ♂ considerably exceeding the larger of the tibial spurs in length.

A. stridulator, Sharp. Oblong-oval, black, polished, not reticulate above; antennæ and feet rufous, femora picescent .24 in.

A. semivittatus, Lec. Rather broadly ovate, black, shining, sides of thorax nearly straight, elytra finely and obsoletely punctulate, dorsal series of punctures rather deeply impressed, irregular, confused towards the apex. A submarginal yellow vitta is found in the apical third, the hind tibiæ are punctate at base. .35 in.

A. semipunctatus, Kirby. Ovate, convex, shining, black, sides of body rather parallel. Elytra very finely reticulate, dorsal series of punctures well marked, additional ones in the intervals. Hind tibiæ smooth. .24 in.

Group III. Anterior claws elongate, sinuate, compressed, or obtusely dentate in the males.

A. Erichsoni, Har. Oblong-oval, very convex, black, ænescent above, elytra obscurely ferruginous at the sides, densely and conspicuously reticulate. Antennæ rufous, feet piceous. Posterior angles of thorax obtuse. .40 in.

A. seriatus, Say. Ovate, sub-convex, black, above bronzed, legs rufescent. Elytra with fine reticulations, shining, hind angles of thorax rectangular. .40 in.

A. parallelus, Lec. Much like *seriatus*, but is said to differ in the more elongate parallel form and black legs. .42 in.

A. infuscatus, Aubé. Ovate, brassy-black, mouth, legs, sides of thorax, margins of elytra and ventral segments yellowish-brown, the femora infuscate. Thorax with the surface coarsely rugulose and reticulate, elytra very finely reticulate. .30 in.

A. anthracinus, Mann. Ovate, convex, black, slightly bronzed

above, antennæ, legs and humeral region of elytra pitchy-red, anterior thoracic angles rufescent. Elytra rather coarsely reticulate with unequal areolæ, dorsal series of punctures obsolete. .30 in.

A. subfuscatus, Sharp. Oval, highly polished, black, prothorax somewhat ænescent, elytra fuscous, base and sides vaguely testaceous, antennæ and feet rufo-testaceous. Elytra sparsely finely punctulate, not reticulate. .30 in.

A. confinis, Gyll. Oblong-oval, polished, nearly smooth, black, elytra blackish, with rufescent sides, antennæ and feet rufous, the femora more or less piceous. Elytra hardly visibly punctulate, the dorsal series irregular. .38 in.

Group IV. Anterior claws of males simple.

A. obtusatus, Say. Ovate, rather convex, black, shining, sides of thorax rounded, more so in the ♂. Elytra with distinct dorsal series confused behind, areolæ rather large; subapical and sublateral vittæ yellow. .30-.32 in.

A. stagninus, Say. Broadly ovate, less convex, black, slightly bronzed, shining, legs paler. Sides of thorax little rounded, strongly margined. Elytra very finely reticulate, with submarginal yellow vitta on apical half. .40 in.

A. punctulatus, Aubé. Black, shining, regularly ovate, antennæ, legs and elytra ferruginous, disk darker. Thorax brassy, sides rufescent, finely margined and nearly straight, the surface irregularly reticulate; elytra finely punctulate, hardly visibly alutaceous, dorsal series rather obsolete, but not irregular. .25 in.

A. reticulatus, Kirby. Ovate, black, legs ferruginous, elytra griseous, with margins and epipleuræ yellowish; thorax fulvous, anterior and posterior margins black, head rufous in front. Elytra with irregular areolæ, giving a somewhat scabrous effect. .30 in.

A. gagates, Aubé. Ovate, convex, shining, piceo-rufous, bronzed above. Head in front and anterior angles of thorax red, sides of thorax slightly rounded, rather strongly margined; elytra finely and closely reticulate, appearing punctulate towards the apex, dorsal series well marked. .38 in.

A. tristis, Aubé. Elongate-oval, rather narrowed behind, tolerably shining, pitchy-black; thorax with anterior angles broadly fulvous, sides slightly rounded, rather strongly margined and sinuate. Elytra rather evidently coarsely reticulate, areolæ small, dorsal series tolerably distinct

with numerous punctures. .40 in. A variety occurs in California in which the thorax is entirely black.

SCUTOPTERUS, Esch.

Two species are recorded from Canada, neither of which are known to us in nature. They are, according to Dr. Sharp, different in shape from the other Colymbetini proper, and remind us somewhat of large *Agabi*. The surface sculpture consists of fine reticulations, resembling that of *A. tristis*. They are thus separated, the measurements being those of Dr. Sharp :—

Shining black, serial punctures distinct behind. .64 in. *Hornii*, Cr.
Less shining, piceous black, serial punctures indistinct behind.

.64 in. *angustus*, Lec.

RHANTUS, Esch.

The species of this genus are often yellowish above, with black irrorations on the elytra, and often darker spots on the head and thorax. They are a little less than half an inch in length, and may be separated on the following characters :—

A. Base of prothorax profoundly bisinuate, the hind angles prolonged, acute, black ; legs, antennæ, sides of thorax and elytral epipleuræ rufo-piceous. .40 in. *sinuatus*, Lec.

AA. Posterior angles of thorax not prolonged.

b. Body beneath mainly black, more or less variegate with fulvous. Thorax with two median black spots, head black, front fulvous, elytra and legs fulvous, the former thickly irrorated with black (.47 in.) *binotatus*, Harr.
Thorax yellow, front and hind margins black ; head black, front and vertex fulvous, prosternum and four anterior legs pale (.40 in.) *bistriatus*, Bergstr.

bb. Body beneath pale (.41 in.) *testus*, Lec.

COLYMBETES, Clairv.

Rather large, elongate beetles, with transversely striate elytra.

A. Legs black.

Elytra with sides and basal margin pale. Sides of thorax fulvous (.64-.70 in.) *longulus*, Lec.

Elytra with basal margins and humeral angles pale, thorax fulvous, with transverse black median bar. (.74 in.) . *seminiger*, Lec.

AA. Legs pale (.63 in.), (Fig. 10) . *sculptilis*, Harr.

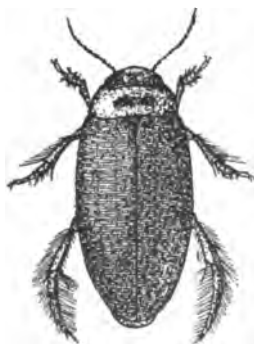


Fig. 10.

LIST OF BUTTERFLIES TAKEN AT WINNIPEG, MAN., 1894.

BY A. W. HANHAM.

Danais archippus, Fabr., June 2nd to 17th, July 8th to August 8th.*Argynnis cybele*, Fabr., July 7th to August 8th." *myrina*, Cram. Rare. Single specimens taken on July 14th and August 4th and 8th." *bellona*, Fabr., May 24th to June 2nd, July 15th to August 8th.*Phyciodes nycteis*, Db.-Hew. Rare. June 17th to 24th." *tharos*, Dru., June 10th to August 14th.*Grapta interrogationis*, Fabr. Both forms bred, July 15th to July 22nd,
 fabricii, Edw. } from full grown larvæ off wild hop vine
 umbrosa, Lint. } in my garden." *comma*, Harr., July 7th and 23rd, August 7th." *progne*, Cram., June 6th, July 14th, and August 2nd." *j-album*, Bd.-Lec. Rare. April 26th and August 14th.*Vanessa antiopa*, Linn., April 28th, July 8th to August 19th." *milberti*, Gdt., April 21st, August.*Pyrameis atalanta*, Linn., July 8th to August 19th." *huntera*, Fabr., July 14th to August 19th." *cardui*, Linn., July 26th and August 5th.(None of these species of *Pyrameis* were abundant.)*Limenitis arthemis*, Dru., middle to end of June." *disippus*, Gdt., end of June and early in August.*Debis portlandia*, Fabr., June 17th to July 22nd.*Neonympha canthus*, Bd.-Lec., July 14th (one specimen).*Crononympha inornata*, Edw., June 17th to 24th.*Satyrus nephele*, Kirby. Plentiful. July 8th to August 18th.*Thecla*, sp. Several examples seen May 20th." *calanus*, Hbn., July 15th (one specimen)." *strigosa*, Harr. (form *Liparops*, Bdv.) Rare. July 8th and 15th." *acadica*, Edw., July 14th and August 8th. (Single examples.)*Chrysophanus thoe*, Bd.-Lec. Rare. July 12th to 22nd." *heloïdes*, Bdv., June 10th to 24th, July 22nd to August 3rd.

The commonest butterfly here this season; especially abundant within the city limits.

Lycæna sæpiolus, Bdv. Local. A stronger flyer than other Blues occurring here. June 17th to 24th." *afra*, Edw. Plentiful. May 24th to end of June.

Lycæna melissa, Edw. Rare. August 3rd to 8th. (No ♀ seen.)

" *pseudargiolus*, Bd.-Lec.

lucia, Kirby, May 20th to June 3rd.

violacea, Edw. } June 2nd to June 17th.

neglecta, Edw. }

" *amyntula*, Bdv. Abundant. May 24th to June 21st.

Pieris oleracea, Harr. Rare. June 3rd.

" *rapæ*, Linn., May 11th to September 3rd.

Colias eurytheme, Bdv., June 21st to 24th, July 14th to August 14th.

" *philodice*, Gdt., May 27th, July 8th to September 3rd.

" *interior*, Scud. One specimen taken by Mr. Lewis towards the end of June.

A white *Colias* seen and chased on June 24th.

Papilio turnus, Linn., June 2nd to 17th.

" *asterias*, Fabr. Examples taken July 15th and August 9th.

What appeared to be a black *Papilio* was seen on the wing in town on May 20th.

Ancyloxypha numitor, Fabr., June 24th. (One.)

Thymelicus garita, Reak., June 17th and 24th. Single examples.

Pamphila hobomok, Harr., June 2nd to 21st.

" *manitoba*, Scud. Local. August 3rd to 19th. (No ♀ captured.)

" *peckius*, Kirby. Middle of July to August.

" *mystic*, Scud., June 21st to end of month.

" *cernes*, Bd.-Lec., July 15th to August 4th.

" *metacomet*, Harr. Rare. Middle of July.

Amblyscirtes samoset, Scud., June 16th (one). On June 3rd an *Amblyscirtes* was missed; it may, however, have been this species.

Pyrgus tessellata, Scud. Mr. Lewis gave me a specimen of this insect taken early in July.

Nisoniades brizo, Bd.-Lec., May 25th to June 10th.

" *icelus*, Lint., June 2nd and 6th.

" *lucilius*, Lint., a worn specimen on August 14th.

" *juvenalis*, Fabr., May 25th to June 10th.

Eudamus pylades, Scud., May 25th to June 10th.

" *tityrus*, Fabr. Rare. July 8th (one).

A number of these species were new to me, and were kindly identified by Mr. James Fletcher, of Ottawa, to whom my thanks are due.

NEW TACHINIDÆ WITH A SLENDER PROBOSCIS.

BY D. W. COQUILLET, WASHINGTON, D. C.

The Tachinidæ described below have a slender, rigid proboscis, of which the portion beyond the basal articulation is at least one-half longer than the height of the head. All are from the Pacific Coast, and, except where otherwise stated, were captured or bred by the writer.

Siphona plusia, n. sp.—♂ ♀ Terminal section of proboscis—the part beyond the second geniculation—not more than three-fourths as long as height of head. Frontal vitta yellow, less than twice as wide as either side of the front next the antennæ; sides of front grayish pollinose, frontal bristles descending nearly to apex of second antennal joint, two pairs of orbital bristles; face whitish, the sides bare; vibrissæ inserted near the oral margin, only two or three small bristles above each; cheeks less than one-fourth as wide as height of eyes. Antennæ black, four-fifths as long as the face, the third joint three times as long as the second, two and one-half times as long as wide; arista thickened on the basal half, the penultimate joint twice as long as wide. Proboscis brown, palpi yellow. Thorax and scutellum black, gray, pollinose, the former bearing three post-sutural macrochaetæ, the scutellum with a small, cruciate apical and three long lateral pairs. Abdomen black, the sides of the first segment broadly, and sometimes also of the second, except the hind corners, yellow; gray pollinose, more or less of the hind margins of the segments shining; a marginal pair and a single lateral macrochaeta on the second segment, a marginal row of six on the third and of four on the fourth. Legs yellow, the tarsi and usually the front femora and apices of the others, blackish; claws and pulvilli very small. Wings hyaline, third vein bristly at least half way to the small cross-vein, the others bare; hind cross-vein straight, perpendicular; calypteres white. Length, 3 to 4.5 mm. Southern California. Thirty-one specimens. Of these, sixteen were bred from larvæ of *Plusia californica*, April 26th, 1883, and July 2nd, 1892; four others were bred from an unknown Noctuid larva July 31st, 1890; the remainder were captured in February and March.

Isoglossa, n. gen.—Proboscis slender, rigid, the portion beyond the basal articulation nearly twice as long as height of head, labella not differentiated; palpi clavate, well-developed. Eyes thinly pilose. Head not inflated, nearly quadrangular, broader than the thorax; face slightly receding, lower margin of head straight, slightly longer than length of head at base of antennæ, anterior pair of ocellar bristles directed obliquely

outward, frontal bristles in a single row, three beneath base of antennæ. Facial ridges strongly diverging from their upper nearly to their lower ends, then strongly converging, but their lower ends widely separated, the ridges bristly on slightly more than the lower half; sides of face bare, each one-fifth as wide as the central fovea, the latter destitute of a median carina; vibrissæ rather short, inserted near the oral margin. Antennæ inserted considerably above the middle of the eyes, nearly as long as the face, the third joint five times as long as the second, rounded at the tip; arista bare, not longer than the third antennal joint, thickened on the basal four-fifths, the penultimate joint nearly one-half as long as the last one. Cheeks over one-third as wide as height of eyes, wholly pilose. Scutellum bearing a small, cruciate, apical pair of macrochaetæ and two long lateral pairs. Abdomen elongate-oval, slightly narrower than the thorax, the four segments subequal in length, destitute of a ventral process; macrochaetæ discal and marginal. Hind tibiæ not ciliate, claws and pulvilli nearly as long as the last tarsal joint. Apical cell open, ending the length of the small cross-vein before the tip of the wing, hind cross-vein slightly oblique, near the last third of the distance between the small cross-vein and the bend, the latter obtuse-angular, destitute of an appendix; third vein bearing two or three bristles at the base, the others bare; penultimate section of fifth vein nearly five times as long as the last section. (Name from the Greek: *isos* equal and *glossa* tongue.) Type, the following species.

Isoglossa hastata, n. sp.—♂ Frontal vitta brown, gray pollinose, subequal in width to either side of the front next the antennæ; front and face light gray pollinose, a blackish spot each side between them; antennæ, arista and proboscis black, the palpi yellow. Thorax and scutellum black, gray pollinose, the former with four black vittæ and three post-sutural macrochaetæ. Abdomen black, opaque gray pollinose, the sides of the last three segments broadly orange-yellow, the two spots meeting on the hind end of the last segment; genitalia black, protruding one-fifth the length of the last segment beyond the latter. Legs black. Wings hyaline, calypteres white. Length, 6 mm. Southern California. A single specimen in April.

Drepanoglossa occidentalis, n. sp.—♀ Arista thickened on the basal fourth, proboscis beyond the basal articulation one-half longer than height of head. Frontal vitta brownish-yellow, three-fourths as wide as either side of front next the antennæ, sides of front and face whitish pollinose;

frontal bristles descending nearly to tip of second joint of antennæ, two pairs of orbital bristles; sides of face bare; vibrissæ inserted some distance above the oral margin, only two or three small bristles above each; cheeks over one-third as wide as height of eyes. Antennæ four-fifths as long as the face, yellow, the third joint black, two and one-half times as long as the second, nearly four times as long as broad; penultimate joint of arista not longer than broad. Proboscis and palpi yellow, labella black. Thorax black, grayish pollinose, marked with four black vittæ, the outer ones broadly interrupted; three post-sutural macrochaetæ. Scutellum yellowish, bearing a small apical and two long lateral pairs of macrochaetæ. Abdomen yellow, a black dorsal vitta on the last three segments, most expanded on the third; a marginal pair and a single lateral macrochaeta on the second segment, and a marginal row of six on each of the two following. Legs, including the coxæ, yellow, the tarsi black; claws and pulvilli less than one-half as long as the last tarsal joint. Wings hyaline, no costal spine, third vein bearing two bristles at the base, the others bare; apical cell open slightly before the tip of the wing, hind cross-vein sinuate and very oblique, at last third of distance between the small cross-vein and the bend, the latter arcuate; calypteres whitish. Length, 8 mm. Southern California. A single specimen in July.

Drepanoglossa venatoris, n. sp.—♀ Differs from the above description of *occidentalis* only as follows: Frontal vitta scarcely more than one-half as wide as either side of the front, cheeks over one-half as wide as height of eyes. Third joint of antennæ twice as long as the second, only twice as long as wide. Proboscis black. Scutellum, bearing an additional lateral pair of macrochaetæ. Abdomen black on last two segments, yellowish-gray pollinose, third segment with a marginal row of ten, the fourth with a discal row of ten and a marginal row of eight macrochaetæ. Claws and pulvilli nearly as long as the last tarsal joint. Third vein bristly half way to the small cross-vein, costal spine distinct, fourth vein obtuse-angular at the bend, hind cross-vein straight. Length, 9 mm. Washington. A single specimen from Prof. O. B. Johnson.

Siphophyto setiger, n. sp.—♂ Second segment of abdomen bearing a marginal pair of macrochaetæ. Frontal vitta yellowish-brown, subequal in width to either side of front next the antennæ, sides of front grayish pollinose, frontal bristles descending to base of third antennal joint, two pairs of orbital bristles; face whitish pollinose, the sides bare; vibrissæ inserted near the oral margin, only two or three small bristles above each;

cheeks over one-third as wide as height of eyes. Antennæ black, five-sixths as long as the face, the third joint five times as long as the second, five times as long as broad; arista thickened on the basal three-fourths, the penultimate joint over twice as long as broad. Proboscis black, the part beyond the basal articulation one-half longer than height of head, slender, the labella scarcely thicker; palpi yellow. Thorax and scutellum black, grayish pollinose, the former bearing three post-sutural macrochaetæ, scutellum with two long pairs. Abdomen black, subshining, base of each segment excepting the first narrowly gray pollinose; second segment with a marginal pair and a single lateral macrochaeta, the following each with a marginal row of six. Legs black, claws and pulvilli very small. Wings hyaline, base of third vein bristly, the others bare; apical cell closed slightly before the margin near the tip of the wing, hind cross-vein straight, perpendicular, slightly nearer to the small cross-vein than to the bend, the latter arcuate; calypteres whitish. Length, 4 mm. Southern California. A single specimen in February.

Siphophyto opacus, n. sp.—♀ Differs from the above description of *setiger* only as follows: Second segment of abdomen destitute of a marginal pair of macrochaetæ. Third joint of antennæ four times as long as broad, penultimate joint of arista only one-half longer than broad. Abdomen, except the first segment, wholly opaque gray pollinose, first and second segments each with a lateral macrochaeta, the third with a marginal row of six, the fourth with a similar row of eight. Length, 5 mm. Southern California. A single specimen in April.

NOTES ON THE THYATIRIDÆ.

BY HARRISON G. DYAR, A. M., NEW YORK.

In describing the larval characters of this family (Proceedings of the Boston Society of Natural History, 1894, p. 399), I followed the arrangement of generic terms in Smith's list; but I believe that it can be improved. So I would arrange the genera of this neat little family as follows (following Hampson):—

Fore wing with a tuft of scales at internal angle.

Fore wing not elongated; outer margin rounded. *Habrosyne*.

Fore wing elongated; outer margin subangulate. *Pseudothyatira*.

Fore wing without this tuft.

Fore wing with vein 6 arising from angle of cell or below.

Accessory cell reaching less than half way to apex. *Thyatira*.

Veins 7 to 9 long-stalked (accessory cell long). *Euthyatira*.

Fore wing with vein 6 stalked; colour gray. *Bombycia*.

Genus *Habrosyne*, Hübner.*H. scripta*, Gosse.

Our single species is closely allied to the European *H. derasa*. Dr. Ottolengui has distinguished a climatic variety in his collection, which is of interest. The larva is known.

Genus *Pseudothyatira*, Grote.

Closely related to the preceding. The larva of one form is known, and closely resembles that of *Habrosyne*. As I have not seen the proof that the two forms classed here are but varieties, I would prefer to give them specific rank. I have seen no intergrades.

P. cymatophoroides, Grote.*P. expultrix*, Grote.Genus *Euthyatira*, Smith.

The larva of the only known species is widely different from that of the European *Thyatira batis*. Our larva is a concealed feeder, and without markings, while the European one possesses the structure of *Habrosyne*, but still further developed.

E. lorata, Grote.*E. pudens*, Guenée.*E. semicircularis*, Grote.

The structure of the veins excludes this last species from *Bombycia*; its markings do not differ essentially from those of *Euthyatira*, though the outer white patches are all lost, and the wings are rather broad.

Genus *Bombycia*, Hübner.

Mr. Hampson, in his Moths of India, refers *Bombycia* to the *Noctuidæ*, but this is the *Bombycia* of Stephens, not of Hübner (type *B. viminalis* Fab.). According to Mr. Grote, the type of *Bombycia*, Hübner, is *B. or*, of Europe. We have two species, or possibly varieties, congeneric with this type.

B. improvisa, Hy. Edw.*B. tearlei*, Hy. Edw.

The larvæ are unknown.

The two species numbered 1,467 and 1,469, in Smith's list, have been already removed from the family. Concerning No. 1,467, *magnifica*, Streck., Mr. Grote writes in the Entomologist's Record and Journal of Variation (Vol. VI., p. 80):—"Examined by me in 1882, and determined then to be a *Cossid*." The reference of this species to *Cossula* by the late Mr. Neumoegen and myself was quite independent of Mr. Grote's observation, and it is interesting to have his positive determination thus corroborate ours, made solely from the description.

Bombycia candida, Smith, will require further examination before it can be accurately placed among the *Thyatiridæ*.

PRELIMINARY STUDIES IN SIPHONAPTERA.—IV.

BY CARL F. BAKER, FORT COLLINS, COLO.

Genus Pulex (Division II. continued.)*

TABLE OF SPECIES OF GROUP 2.

- A. Abdominal segments each with three dorsal rows of bristles ; whole insect very heavily spined and bristled ; antennal groove in middle of head ; bristles on joint 2 of antennæ longer than joint 3 ; maxillary palpi in female with joint 2 four-fifths of 4, and 3 two-thirds of 4 ; labial palpi reaching to one-third of anterior femora ; pronotal comb of 20 spines ; in anterior tarsi joint 3 two-thirds of 2 and shorter than 1, 5 twice 4 and less than 1 and 2 together ; in middle tarsi joint 2 slightly shorter than 1 and longer than 5, 5 twice 4, and 1 long as 3 and 4 together ; in posterior tarsi joint 1 long as 2 and 3 together, 5 one-half of 1 and much longer than 3, 2 about as long as 3 and 4 together, and less than 4 and 5 together ; hind femora with a row of bristles on the side ; leg spines long, apical spines on second joint of hind tarsi longer than joints 3 and 4 together ; colour, light brown ; length, 2-3 mm. . . . *hirsutus*, n. sp.
- AA. Abdominal segments each with one dorsal row of bristles ; antennal groove in middle of head ; maxillary palpi in female with joint 3 three-fourths of 4 ; labial palpi reaching to one-third of anterior femora ; spines on legs medium ; apical spines on joint 2 of hind tarsi longer than joints 3 and 4 together ; in middle tarsi joint 5 longer than twice 4, 1 shorter than 3 and 4 together ; hind femora with a row of bristles on side *D*.
- AAA. Abdominal segments each with two dorsal rows of bristles ; in middle tarsi joint 1 equals 2 ; bristles on joint 2 of antennæ long as joint 3 ; spines on legs medium. *B*.
- B. Apical spines on joint 2 of hind tarsi long as joints 3 and 4 together ; antennal groove in middle of head ; maxillary palpi in female with joint 2 three-fourths of 4, and 3 two-thirds of 4 ;

**P. pencilliger*, Grube, and *P. metallescens*, Kol., should have been mentioned as belonging to this division. The very insufficient descriptions render their location impossible. The former was described from various *Mustelida*, and the latter from *Xantharpyia aegyptiaca*. *P. echidna*, Denny, described from *Echidna hystrix* (Van Diemen's Land), should likewise have been mentioned in connection with Division I. These names doubtless represent good species, and it is to be hoped that collectors living within the range of these animals will take pains to obtain good series of the fleas infesting them.

- labial palpi reaching to one-third of anterior femora ; pronotal comb of 16 spines ; in anterior tarsi joint 2 longer than 1 and one-third longer than 3 ; in middle tarsi joint 1 equals 3 and 4 together and shorter than 5, while 5 is twice 4 ; in posterior tarsi joint 1 equals 2 and 3 together, 5 a little longer than 3 and less than one-half of 1, while 2 is three times 4 and less than 4 and 5 together ; hind femora with a row of bristles on side ; colour, light reddish-brown, darker dorsally on abdomen ; length, 2-2.5 mm.....*Bruneri*, n. sp.
- BB. Apical spine on joint 2 of hind tarsi shorter than joint 3 ; pronotal comb of 18 spines ; in anterior tarsi joint 1 little, if any, longer than 3.....*C.*
- C. Antennal groove in anterior half of head ; maxillary palpi in female with joint 2 little shorter than 4, 3 two-thirds of 4 ; labial palpi reaching to end of anterior trochanters ; in anterior tarsi joint 5 shorter than 1 and 2 together, 1 and 2 nearly equal ; in middle tarsi joint 5 equals twice 4, and about the same as 2, while 1 about equals 3 and 4 together ; in posterior tarsi joint 5 shorter than 3 and 4 together, and one-half of 1, 2 is three times 4 and long as 4 and 5 together ; colour, light brown, darker dorsally on abdomen ; length, 2.5-3 mm.*sciurorum*.
- CC. Antennal groove in posterior half of head ; labial palpi reaching to one-third anterior femora ; in anterior tarsi joint 2 long as 3 and 4 together, 1 twice 4 ; in middle tarsi joint 5 equals 3 and 4 together ; in posterior tarsi joint 1 twice 2, 5 shorter than 1 and long as 3 and 4 together ; colour, light reddish brown ; length, 5 mm.....*melis*.
- D. Apical spine on joint 1 of hind tarsi only half as long as joint 2 ; maxillary palpi in female with joint 2 longer than 4 ; bristles on joint 2 of antennæ shorter than joint 3 ; pronotal comb of 12 spines ; in anterior tarsi joint 2 longer than 3 and about equal to 1, 5 twice 4 and shorter than 1 and 2 together ; in middle tarsi joint 5 one-fourth longer than 2 ; in posterior tarsi joint 5 long as 3 and 4 together, and one-half of 1, 2 three times 4 and more than 4 and 5 together ; colour, light brown ; length, 2 mm.....*longispinus*, n. sp.
- DD. Apical spine on joint 1 of hind tarsi nearly as long as joint 2 ; maxillary palpi in female with joint 2 shorter than 4 ; bristles

on joint 2 of antennæ longer than joint 3 ; pronotal comb of 16 spines ; in anterior tarsi joint 1 equals 3 and is shorter than 2, 5 long as 1 and 2 together, and nearly three times 4 ; in middle tarsi joint 5 one-fifth longer than 2 ; in hind tarsi joint 5 less than 3 and 4 together, but more than one-half of 1, 2 twice 4, but less than 4 and 5 together ; colour, light brown, darker dorsally on abdomen ; length, 2.25-2.5 mm... *montanus*, n. sp.

Pulex hirsutus, n. sp.

This flea, with its long and abundant spines and bristles, presents a very unusual appearance. It was collected on the Prairie Dog (*Cynomys ludovicianus*), at Stove Prairie, Larimer Co., Colo., by Prof. C. P. Gillette.

Pulex Bruneri, n. sp.

I have received specimens of this species taken on *Spermophilus 13, lineatus* and *S. Franklini*, at Lincoln, Neb., by Prof. Lawrence Bruner, and others, taken on the first named host by Prof. Herbert Osborn. I have also taken specimens from the same host at Fort Collins.

Pulex sciurorum, Bouche.

1835. Bouche, Nov. Act. Acad. Leop., Carol., XVII., 1., p. 506.

I have specimens of this species from Dr. Taschenberg, taken on *Sciurus vulgaris* in Germany. It has also been recorded from *Rhinolophus ferrum-equinum*. I do not know that it occurs in North America.

Pulex melis, Walker.

1856. Walker, Insecta Britt. Diptera, III., p. 5.

This very large and long flea has been recorded from *Meles taxus* and *Canis vulpes*. I have seen no fleas from either badger or fox collected in North America.

Pulex longispinus, n. sp.

I have received specimens of this flea taken on Fremont's Chickaree at Georgetown, Colo., with *P. coloradensis*. It seems likely that there is an error in the data for either this species or *P. coloradensis*. It is not a usual occurrence for two species of fleas to be found living together on a single wild animal. These species are totally distinct.

Pulex montanus, n. sp.

My specimens of this flea were taken from the large Mountain Grey-Squirrel (*Sciurus Aberti* ?), in the foothills west of Fort Collins, by Prof. J. D. Stannard.

[TO BE CONTINUED.]

OBITUARY.

The following particulars respecting our late correspondent have only recently been obtained :—

Oliver Jacob Staley, of Marshall, Saline Co., Mo., died July 6th, 1894 while on a collecting trip near home. His body was found by searching parties, in a creek, face downward. A sultry day induced him to bathe with fatal result. He was born in Princetown, Schenectady Co., N. Y., and removed with his parents to Marshall, Mo., thirteen years ago. He practiced law for about four years, and was in the twenty-fifth year of his age. A member of the Y. M. C. A., he was much respected by everybody. He published in the CANADIAN ENTOMOLOGIST, Vol. XXIV., p. 201, "A List of Butterflies found at Marshall, Missouri, and vicinity." During the last six years he had been actively collecting Lepidoptera.

R. E. KUNZE.

NOTE ON THE PLATYPTERYGIDÆ.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In the Proceedings of the American Philosophical Society for 1874 is published a list of certain family groups of Bombycine moths, and I retained there the term *Platypterices*, of Hubner, 1806, for the group to which now a distinct family value is given, and which should therefore bear the name *Platypterygidæ*. Already in 1868, Trans. Am. Ent. Soc., I had proposed the subfamily termination to the corrected original term of Stephens: *Platypterica*. The question as to which of the two terms should be employed, *Drepanidæ* or *Platypterygidæ*, should, I think, be decided in favour of the latter form of the plural use of the name by Hubner and Stephens. Schrank's original genus *Drepana* is the first generic term used in the group. The genus is a mixed one. It contains: 1, *D. sicula*; 2, *D. falcula*; 3, *D. flexula* (not belonging here); 4, *D. hamula*; 5, *D. lacertula*; 6, *D. spinula*. Schrank's definition is "Sichel-spinner." Laspeyres's restriction (1803) of the group under the name *Platypteryx* is the first to be made, and Hubner, in 1806, still further restricts Laspeyres's name to the single type *P. hamula*. To this structural type should the name *Platypteryx* be henceforth confined, and with this type our North American species, *arcuata*, *genicula* and *siculifer* appear to agree. From the description I have shown there is a probability that Stephens's *Drepana fasciata* was based upon one of our *Geometridæ* belonging to *Drepanodes*. So far, then, as our fauna is concerned, the

exact type of *Drepana* (one of the above six species of Schrank's) is not now in question. In 1868 I did not know the use of Laspeyres's term by Hubner in 1806, and following Stephens, incorrectly used *Drepana* for our species; but I changed this use in the paper above cited in 1874, reverting to the name *Platypteryx* used by me in my first paper on our species, Proc. Acad. Nat. Sci., Phil., 1862, p. 59.

ADDITIONS TO THE LIST OF U. S. HYMENOPTERA.

BY T. D. A. COCKERELL, NEW MEXICO AGR. EXP. STA.

(1.) *Smicra divisa*, Walker.—On July 8th, 1892, Prof. C. H. T. Townsend collected some specimens of a *Smicra* in the Grand Canon, Arizona; and on July 27th he obtained what is doubtless a ♂ of the same species, at the Zuni River, Arizona. These had remained in our collection unnamed, until Miss MacGilmore, a student in zoology, worked them over, and concluded they were probably Walker's *divisa*. I hardly agreed with this, rather thinking the insect was new, but Mr. Ashmead has now seen a specimen, and declares it is really *divisa*. The type locality of *S. divisa* is Orizaba, Mexico, and no other specimens than Walker's were known to Mr. Cameron when writing the Chalcididae of Biol. Cent. Am. The Grand Canon specimens differ from Walker's short description in the scutellum having two yellow spots, not a yellow hind border. The teeth on the hind femora deserve some comment. Walker says: "One large and several small teeth." Cameron places the species in his section B.: "Femoral teeth small, minute, more than eight in number." Our insect has one large and six small teeth, and so could not be *divisa* if Cameron were correct; but the little that Walker says accords with our species, and would place it in Cameron's section A.

(2.) *Philanthus multimaculatus*, Cameron.—One on *Chilopsis* in Mr. Barker's garden, at Las Cruces, N. M., June 5th, 1894. A pretty and distinct species, easily recognized by Cameron's figure and description in the Biol. Cent. Amer. The type locality is Atoyac, in Vera Cruz, Mexico.

(3.) *Crabro centralis*, Cameron.—On *Solanum elaeagnifolium* in open ground behind the Central Hotel, in Las Cruces, N. M., June 10th, 1894 (Ckll., 887). This was identified for me by Mr. Fox, and will be included in his forthcoming memoir on N. A. Crabronidae. I mention it now only to call attention to the curious fact that it also originally came from Atoyac, in Vera Cruz, being, however, also found in Guatemala and Panama.

A NEW PULVINARIA FOUND ON ORCHIDS.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Pulvinaria brassiæ, n. sp.

♀ scale rather like *Lecanium hesperidum*, elongate-oval, flattish, pale olive-brown, $2\frac{1}{2}$ mm. long. Ovisac white, firm, elongate, parallel-sided, distinctly longitudinally grooved, 8 mm. long, 2 broad. Derm colourless, not tessellate. Margin with a double row of easily-deciduous, strong, usually large, blunt spines, which are, near the lateral and posterior clefts, more or less branched at their tips. Spines of lateral clefts in threes, one very long and large, two very short and small. Anal plates brown, longer than broad, their outer sides meeting at about a right angle. Each plate with three small spines at tip, and three large bristles on outer hind margin. Anogenital ring with six stout hairs. Rostral loop reaching to level of insertion of middle pair of legs. Antennæ 8-jointed; 3 longest, but not greatly so. Formula 32 (458) 167. Two and 5 each with a long hair; 8 with several long hairs. Legs ordinary; coxa more than half as long as trochanter + femur. Trochanter with a strong, but not very long, bristle. Claw short, stout, curved. Tarsal digitules long, moderately stout, distinctly knobbed. Digitules of claw extremely stout, gradually widening to the large knobs.

Hab.—On leaves of *Brassia verrucosa*, a native of Mexico, in greenhouse at Ottawa, Dec. 15th, 1894 (J. Fletcher). The actual plant was purchased from a New Jersey florist, and the insect has been found on no other in the house. It is quite a distinct and peculiar form of the type of *P. camellia*, but smaller, with a much narrower, ribbed ovisac. I regret that I have not seen the description of *P. linearis*, Targ., 1885, found on *Camellia japonica*, but it is doubtless safe to assume that it cannot be that species.

THE USE OF MEGALOPYGE.

BY A. R. GROTE, A. M., BREMEN, GERMANY.

In the able and original paper on "Evolution and Taxonomy," by my friend, Prof. Comstock, published in 1893, is a note, on page 103, relating to the use of the generic title *Megalopyge*. The author says, referring to Berg's (not "Berge") articles on Argentine Lepidoptera: "This monograph seems to have been overlooked by American writers." This seems not quite correct. In *Papilio*, Vol. 3, 106-8, I have published (1883) a review of these papers by C. Berg. I took, in the course of a lengthy

review, the ground that Hubner's genus *Megalopyge* was a mixed genus, being proposed for two species, *lanata* and *nuda*, and that there was no proof that these two species were congeneric. In the absence of such proof, it was not correct for Berg to designate *lanata* (and its structural allies) as either the type of or typical of *Megalopyge*. Under these circumstances, I preferred Harris's term *Lagoa* as a proper restriction of Hubner's genus for the type to which *pyxidifera*, *opercularis* and *crispata* belong. I did not know then, what seems to be the fact, that *Lagoa* was preoccupied and must be wholly rejected on this score. But then *Pimela*, Clem., 1860, for the same type must be considered as the next available term for a restriction of *Megalopyge*. The matter stands thus: If *lanata* and *nuda* are congeneric, then *Pimela* falls as a synonym of Hubner's genus. If these two are *not* congeneric, then Clemens's term must be used for *lanata* and our North American species, as the first restriction of Hubner's genus, and *Megalopyge* must be left to the type *nuda*, a species quite unknown to me. As to this and related matters, I think I can refer the student to the paper in "Papilio," above cited, in which I drew the attention of American Lepidopterists quite fully to Berg's valuable writings.

BOOK NOTICES.

"The Classification of the Lepidoptera," by Vernon L. Kellogg, American Naturalist, Vol. XXIX., pp. 248-257, plate XVII. (March, 1895).

Mr. Kellogg reviews Prof. Comstock's classification of the Lepidoptera especially in regard to the establishment of the sub-orders Jugatæ and Frenatæ (Evolution and Taxonomy), and shows how his own researches on the wing scales corroborate this division. He adds nothing essential to his former results in this direction (Kansas Univ. Quarterly, III., 45-89, 1894), and so far it appears that the wing scales do not afford a basis for the subdivision of the Frenatæ. The new part of the present article consists of a consideration of the mode of specialization of the meso- and meta-thoracic segments, as effected by a cephalization of the powers of flight. The Jugatæ are found to be in a generalized condition in this respect, but apparently not more so than certain Tineidæ; therefore, the result of this investigation is not a convincing support of Prof. Comstock's sub-orders, though it does show that the Hepialidæ belong low in the scale, as they are placed in Dr. Chapman's pupal classification. It is another argument against the old group of Bombyces.

HARRISON G. DYAR.

Notes on Butterfly Pupæ, with some remarks on the Phylogenesis of the Rhopalocera. By T. A. Chapman, M. D.

Readers of the Entomologist's Record (P. Heinsberger, 9 First Avenue, New York, Agent) will have been for some time interested in Dr. Chapman's writings. The description of the different "dresses" of the larvæ of *Arctiida* have shown us that the phylogeny of the different genera in this group can be studied to advantage by a systematic classification of larval characters. Each stage of the metamorphic Hexapod must be considered by itself and the larva (as we have seen from Mr. Dyar's writings) should be treated as an independent existence. The more so since the environment is peculiar and modification to meet its requirements is so abundantly displayed. In his present paper in the Record for March 15th, 1895, Dr. Chapman considers the butterfly pupa by itself. The author draws attention to the "progress which is evident in the pupæ of *Rhopalocera*, as in those of *Heterocera*, from a condition of greater to one of less freedom of the segments; to the progress from a greater number of exposed appendages (a decided 'Micro' character) to a less number, though this is not illustrated amongst butterflies except, perhaps, between Hesperids and Papilionids; and to a general progress towards a smoothly rounded, solid form, which, however, is greatly interfered with amongst the butterflies by the exigencies of the development of protective resemblance." From observation, Dr. Chapman concludes that movement is never regained by the pupa, when in course of time it has been lost through adaptation. Dr. Chapman also verifies the conclusions laid down by other students that similar structural characters have been reached along different lines by descendants from a common ancestor who did not present any indication of them.

In the course of a very remarkable *exposé* of pupal characters, Dr. Chapman takes occasion to speak very highly of Scudder's Butterflies of New England, while the author's observation of pupæ confirms Mr. Scudder's classification, not only broadly, but in considerable detail. The conclusion Dr. Chapman comes to with regard to *Papilio* is, that *Papilio* still closely represents the primeval butterfly when it had become truly a butterfly as distinguished from a Hesperid. The low rank of *Papilio* would now seem to be confirmed from the independent labours of Scudder, Comstock, Dyar, and Chapman. The genus has "fallen from its high estate," without altering the fact that the Swallow-tails are among

the most beautiful and graceful of butterflies, as well as the most interesting. As representing most nearly the primeval butterfly, *Papilio machaon*, for instance, may still be considered as typical of the group in a wide sense, no less than as typical of the particular family *Papilionidæ* to which it belongs.

Dr. Chapman's paper must be read and studied to be fully appreciated as it deserves. To draw attention to its merits, this brief notice is penned. It adds largely to the store of scientific facts; it is well and clearly written, and is the product of a mind which not only seizes small circumstances, but is able to build from them a theory of the way in which Nature has gone to work.

A. R. GROTE, A. M.

"A Manual for the Study of Insects," by John Henry Comstock and Anna Botsford Comstock, Ithaca, N. Y. Comstock Publishing Co., 1895. (Price, \$3.75.)

This is a work of 700 pages, profusely illustrated. A table of the classes of the Arthropoda is given, followed by a short characterization of the Crustacea. Thirty-three pages are devoted to the Arachnida, and a table is given for separating the principal families of the Araneida. The Myriapoda are briefly referred to, and Chapter III. begins the discussion of the true insects (Hexapoda). Nineteen orders are recognized, and a careful table is given for their practical determination.

In the remainder of the work, 618 pp., the several orders are treated, with tables carrying the student to the families, each illustrated by typical common species, of which brief accounts are given.

In the Lepidoptera, Diptera, and Hymenoptera, the uniform system of nomenclature of the wing-veins discussed by Prof. Comstock in "Evolution and Taxonomy" is applied throughout the orders. As stated in the preface, but slight changes are made from the usual classification of the families, except in the Lepidoptera, where the system proposed in "Evolution and Taxonomy" is adopted with slight changes. This is remarkably like Dr. T. A. Chapman's classification from pupal characters and the present writer's one on larval characters. All three agree on breaking up the old groups Zygænidæ and Bombyces, and the several members are referred to essentially the same places. The work affords

for the first time a means for teacher as well as student to determine the family of any North American insect, for here synoptic tables replace the vague characterizations so generally in vogue in Zoology. To bring the tables down to species, as is done so satisfactorily in Botany, as the author remarks, would make the work of enormous length, not to mention the fact that the present state of our knowledge of insects does not warrant such an undertaking. The work seems a very valuable and timely one.

HARRISON G. DYAR.

[We wish to add to the foregoing notice our hearty congratulations to Professor Comstock and his talented wife upon the completion of their excellent work, and our tribute of praise for the thoroughly admirable manner in which they have performed it. It is now a little more than six years since we noticed in these pages the first part of this work, which consisted of 234 pages and 200 wood-cuts; we then stated that "judging from the portion before us, we have no hesitation in saying that the complete work will be a most valuable and admirable manual of Entomology; in clearness and simplicity of style, in excellence of illustration, and in arrangement of matter, it leaves nothing to be desired." This prediction has been most completely fulfilled, the volume before us being, in several respects, even an improvement upon the original publication. The new illustrations are more artistic, and the diagrams of wing-venation and details are clear and accurate; the synoptic tables will afford any pains-taking student with satisfactory means of classifying into families any specimens that he collects, while the letter-press and figures will enable him to determine a large number of species. We heartily commend the work to all who are beginning to study Entomology, and we can assure others, who have made some progress in the science, that they will find in it a vast deal of help and information that will prove of the utmost value. We may add that the illustrations consist of 800 wood-cuts and six beautiful full-page plates, the one forming the frontispiece being coloured. The price of the work is so reasonable that it is within the reach of all.

C. J. S. B.]

CORRESPONDENCE.

BOMBYCIDÆ—ZYGÆNIDÆ.

In the April number of the CANADIAN ENTOMOLOGIST, Mr. Schaus states (p. 94) that Bombyx has no frenulum. A glance at Prof. Comstock's figure (Evol. and Taxonomy, p. 88) shows it distinct, but very small, so that difference of opinion about it may readily be entertained. This illustrates again that this character is not an adequate one for family definition. Mr. Hampson himself has already abandoned it. (Ann. and Mag. Nat. Hist. (6) xiv., pp. 254-261.)

In the same number Mr. Grote refers frequently to the Zygænidæ (p. 95). Can we not adopt some other name for this objectional term? As long ago pointed out by Westwood, Zygæna is pre-occupied in Ichthyology. Moreover, the name is entirely vague, for we have had associated under it most diverse insects belonging respectively to the more specialized Microlepidoptera (my Anthrocerina) and the higher Arctian type of the Noctuidæ. According to Kirby the type of Zygæna is *phægea*, Linn., an Arctian, while Hampson follows the old custom, and makes the type *filipendulæ*, a micro. I have used the terms Euchromiidæ (Syntomidæ) for the former, Anthroceridæ for the latter.

Now, we have in North America no Zygænidæ (*sensu* Hampson), as pointed out by Prof. Smith; our Pyromorphidæ are the nearest approach to them. Mr. Grote apparently uses the term for the Euchromiidæ, and only continues the confusion; for this fails to bring out the fact, which I think must finally become fully apparent, that the old family Zygænidæ must be separated into elements belonging to fundamentally dissimilar groups of the Frenatæ. Can we not entirely abandon the term Zygænidæ?

HARRISON G. DYAR.

THE ROYAL SOCIETY OF CANADA.

The fourteenth annual meeting of the Royal Society of Canada will be held at Ottawa on the 15th, 16th and 17th of May, 1895. The Rev. T. W. Fyles, South Quebec, P. Q., has been appointed to represent the Entomological Society of Ontario at the meeting.

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THE INSECT FAUNA OF THE SUDBURY DISTRICT, ONTARIO.

BY JOHN D. EVANS, TRENTON.

Prior to the advent of the Canadian Pacific Railway, in the year 1883, this district was entirely unsettled, being, in fact, a *terra incognita* to all except servants of the Hudson Bay Co., officials of the Geological Survey, and Provincial Government surveyors. But it had been devastated to a large extent by forest fires, which occurred at intervals during a period of some fifty or sixty years previously. These fires entirely destroyed the virgin forest (which consisted chiefly of white pine) over large tracts, by killing the trees and leaving them susceptible to the attacks of their insect enemies, and presenting at that date (1883) a desolate appearance, caused by the thickly-standing tall bare trunks and stubs of trees, among which had sprung up a thick growth of saplings of white birch, poplar, etc.

To this great destruction of timber, left to the mercy of its many insect foes and their parasites, etc., may no doubt be attributed the great variety and numbers of insects of the various orders, not to mention the pests of human existence, viz., mosquitoes, and black and sand-flies, the wood borers being especially numerous, both specifically and numerically.

Isolated patches of green pine forest were, however, left untouched among the general destruction, one of which was in the immediate vicinity of the town of Sudbury. This timber was utilized in the construction of the railway, and in after years the bark-covered stumps afforded a great number of a large series of species of insects to those in search of such inhabitants.

The writer, during a period of some seven seasons, collected in the several orders enumerated below, in the lists of which will appear the names of all the species he has as yet had worked out and determined.

LIST OF COLEOPTERA.

In the following list, containing 494 species, there are sixty-five species not enumerated in the Society's list, but of these, four have been

heretofore recorded by Mr. W. H. Harrington, five by Mr. Kilman, and six by Dr. John Hamilton, as having occurred in Canada, leaving fifty to be added to the Society's list, which are designated by an asterisk. My list gives the total number of individuals of each species taken during seven years (1886, 1888-1893), and will thus show which were of common occurrence and which were rare. These were all captured within a radius of five miles from the town of Sudbury, excepting *Calloides nobilis*, Say, and *Leptura vittata*, Germ., which were taken at Algoma Mills, on Georgian Bay, distant from Sudbury about ninety-five miles. *Calosoma scrutator*, Fab., was captured by Dr. Peters within the limits of the town early in the season of 1889, from under the bark of a pine stump, where it had no doubt hibernated during the previous winter.

There are still upwards of one hundred species requiring determination. My warmest thanks are due, and are hereby tendered, to Dr. John Hamilton for his kindness in determining the majority of these species :

LIST OF COLEOPTERA TAKEN AT SUDBURY, ONTARIO.

CICINDELIDÆ.		Pterostichus coracinus, Newm..	
Cicindela longilabris, Say	104	* " moestus, Say	1
" 6-guttata, Fab	1	" punctatissimus,	
" limbalis, Lec	28	Rand	1
" vulgaris, Say	33	Pterostichus lucublandus, Say.	20
" 12-guttata, Dej	6	" mutus, Say	4
CARABIDÆ.		" orinomum, Leach	3
Calosoma scrutator, Fab	1	" Luczotii, Dej	22
" frigidum, Kirby	5	" patruelis, Dej	1
" calidum, Fab	3	Amara exarata, Dej	1
Elaphrus ruscarius, Say	1	" latior, Kirby	1
Dyschirius nigripes, Lec	1	" fallax, Lec	1
Nomius pygmæus, Dej	8	" erratica, Sturm	4
*Psydus piceus, Lec	1	" interstitialis, Dej	5
Bembidium carinula, Chd	1	" subænea, Lec	3
* " paludosum, Sturm	1	" musculus, Say	1
" inæquale, Say	1	Platynus sinuatus, Dej	4
" rupestre, Dej	1	* " errans, Say	4
* " conspersum, Chd.	1	" affinis, Kirby	1
" versicolor, Lec	3	" melanarius, Dej	1
Tachys nanus, Gyll.	11	" corvus, Lec	1

<i>Platynus cupripennis</i> , Say....	5	<i>Rhantus binotatus</i> , Harr.....	15
" <i>8-punctatus</i> , Fab....	2	<i>Colymbetes sculptilis</i> , Harr...	7
" <i>placidus</i> , Say.....	7	<i>Hydaticus stagnalis</i> , Fab	2
" <i>vicinus</i> , G. & H....	1	<i>Dytiscus fasciventris</i> , Say	1
" <i>obsoletus</i> , Say.....	95	" <i>Harrisii</i> , Kirby.....	9
" <i>4-punctatus</i> , Dej....	7	<i>Acilius semisulcatus</i> , Aubé...	6
" <i>sordens</i> , Kirby.....	4	GYRINIDÆ.	
" <i>lutulentus</i> , Lec. . .	3	<i>Gyrinus affinis</i> , Aubé.....	1
<i>Lebia viridis</i> , Say.....	3	" <i>picipes</i> , Aubé.....	3
" <i>pumila</i> , Dej.....	3	HYDROPHILIDÆ.	
<i>Cymindis cribricollis</i> , Dej....	1	<i>Helophorus nitidulus</i> , Lec....	72
<i>Chlœnius sericeus</i> , Forst....	3	" <i>linearis</i> , Lec.....	2
" <i>pennsylvanicus</i> , Say.	2	<i>Hydræna pennsylvanica</i> , Kies.	1
<i>Agonoderus pallipes</i> , Fab....	54	<i>Hydrocharis obtusatus</i> , Say ..	1
<i>Harpalus viridæneus</i> , Beauv..	4	<i>Philhydrus nebulosus</i> , Say . .	3
" <i>fallax</i> , Lec.....	1	<i>Hydrobius fuscipes</i> , Linn....	11
" <i>pleuriticus</i> , Kirby...	3	<i>Cryptopleurum vagans</i> , Lec ..	3
* " <i>cautus</i> , Dej.....	1	SILPHIDÆ.	
" <i>rufimanus</i> , Lec.....	2	<i>Necrophorus vespilloides</i> ,	
<i>Stenolophus fuliginosus</i> , Dej..	1	Hbst.	6
" <i>conjunctus</i> , Say..	2	<i>Necrophorus tomentosus</i> , Web.	1
" <i>ochropezus</i> , Say.	1	<i>Silpha surinamensis</i> , Fab.....	17
<i>Tachycellus nigrinus</i> , Dej....	3	" <i>lapponica</i> , Hbst.....	17
<i>Anisodactylus baltimorensis</i> ,		" <i>noveboracensis</i> , Forst..	32
Say.....	2	" <i>americana</i> , Linn.....	14
HALIPLIDÆ.		<i>Choleva clavicornis</i> , Lec.	1
* <i>Haliplus borealis</i> , Lec.	2	<i>Prionochæta opaca</i> , Say	1
" <i>ruficollis</i> , Dej....	12	<i>Liodes globosa</i> , Lec.....	2
DYTISCIDÆ.		<i>Liodes basalis</i> , Lec.....	1
<i>Cœlambus inæqualis</i> , Fab....	12	<i>Agathidium politum</i> , Lec....	1
* <i>Ilybius subæneus</i> , Er.	11	PSELAPHIDÆ.	
" <i>biguttatus</i> , Germ....	1	* <i>Bryaxis conjuncta</i> , Lec.....	3
<i>Agabus parallelus</i> , Lec	1	STAPHYLINIDÆ.	
" <i>seriatus</i> , Say.....	2	* <i>Aleochara lata</i> , Grav.....	12
" <i>infuscatus</i> , Aubé	2	" <i>bimaculata</i> , Grav.	1
" <i>gagates</i> , Aubé	2	<i>Gyrophæna socia</i> , Er.....	964
* " <i>leptapsis</i> , Lec.....	2		
<i>Scutopterus Hornii</i> , Cr.....	1		

<i>Heterothops fumigatus</i> , Lec..		<i>Coccinella transversoguttata</i> , Fab.....	35
<i>Quedius lævigatus</i> , Gyll.....	3	<i>Coccinella 5-notata</i> , Kirby...	1
<i>Listrotrophus cingulatus</i> , Grav. 13		" <i>monticola</i> , Muls...	3
<i>Creophilus villosus</i> , Grav.....	22	" <i>tricuspis</i> , Kirby...	15
<i>Philonthus æneus</i> , Rossi.....	12	" <i>sanguinea</i> , Linn...	1
" <i>varians</i> , Payk.....	1	<i>Adalia bipunctata</i> , Linn.....	1
" <i>micans</i> , Grav. ...	1	<i>Harmonia picta</i> , Rand.....	1
" <i>lomatus</i> , Er.....	2	" <i>14-guttata</i> , Linn...	2
" <i>cyanipennis</i> , Fab..	1	* <i>Harmonia 14-guttata</i> , var. ob- liqua, Rand.....	1
" <i>sordidus</i> , Grav....	1	<i>Harmonia 12-maculata</i> , Gebl.	5
<i>Xantholinus cephalus</i> , Say... 45		<i>Anatis 15-punctata</i> , Oliv.....	9
" <i>obscurus</i> , Er....	2	<i>Chilocorus bivulnerus</i> , Muls..	2
<i>Baptolinus macrocephalus</i> , Nord.....	2	* <i>Exochomus marginipennis</i> , Lec	1
<i>Lathrobium simplex</i> , Lec.... 10		* <i>Scymnus americanus</i> , Muls...	1
<i>Lithocharis confluens</i> , Say....	6	ENDOMYCHIDÆ.	
<i>Pæderus littorarius</i> , Grav.....	2	<i>Lypoperdina ferruginea</i> , Lec..	1
<i>Tachinus memnonius</i> , Grav... 1		<i>Mycetina perpulchra</i> , Newm..	3
<i>Tachyporus elegans</i> , Horn....	1	EROTYLIDÆ.	
<i>Boletobius cinctus</i> , Grav.....	1	<i>Tritoma thoracica</i> , Say.....	1
<i>Habrocerus magnus</i> , Lec.... 33		COLYDIIDÆ.	
* <i>Olisthærus megacephalus</i> , Zett.	2	<i>Cerylon castaneum</i> , Say... .	39
" <i>substriatus</i> , Gyll..	27	CUCUJIDÆ.	
<i>Platystethus americanus</i> , Er... 4		<i>Silvanus planatus</i> , Germ.....	2
<i>Oxytelus rugosus</i> , Grav.....	5	<i>Catogenus rufus</i> , Fabr.....	2
* <i>Homalium punctiventre</i> , Fauv.	1	<i>Pediacus fuscus</i> , Er.....	44
<i>Anthobium convexum</i> , Fauv.. 18		<i>Cucujus clavipes</i> , Fab.....	3
SCAPHIDIIDÆ.		<i>Dendrophagus glaber</i> , Lec...	5
* <i>Scaphisoma punctulatum</i> , Lec.	1	CRYPTOPHAGIDÆ.	
" <i>terminatum</i> , Melsh	2	<i>Loberus impressus</i> , Lec.....	5
CORYLOPHIDÆ.		MYCETOPHAGIDÆ.	
<i>Sacium lugubre</i> , Lec.....	5	<i>Mycetophagus flexuosus</i> , Say..	1
COCCELLIDÆ.		<i>Mycetophagus pluripunctatus</i> , Lec..	1
<i>Anisosticta strigata</i> , Thumb.. 11		<i>Mycetophagus tenuifasciatus</i> , Horn.....	1
<i>Hippodamia 13-punctata</i> , Linn.	33		
" <i>parenthesis</i> , Say..	6		
<i>Coccinella trifasciata</i> , Linn... 39			
" <i>9-notata</i> , Hbst....	4		

DERMESTIDÆ.

Byturus unicolor, Say.....	7
Dermestes caninus, Germ....	12
" lardarius, Linn....	28
Attagenus piceus, Oliv.....	1
Orphilus glabratus, Fab.....	13

HISTERIDÆ.

Hister sœdatus, Lec.....	4
" abbreviatus, Fab.....	2
* " marginatus.....	1
" depurator, Say.....	4
" Lecontei, Mars.....	4
" attenuatus, Lec.....	2
*Paromalus estriatus, Lec....	1
Saprinus rotundatus, Kug....	1
" fraternus, Say.....	5
Plegaderus transversus, Say... 17	

NITIDULIDÆ.

*Cercus pennatus, Mun.....	6
Carpophilus brachypterus, Say.	4
Colastus truncatus, Rand....	4
*Epuræa labilis, Er.....	8
Nitidula bipustulata, Linn....	49
" rufipes, Linn.....	28
Omosita colon, Linn.....	19
Ips fasciatus, Oliv.....	36
" sanguinolentus, Oliv.....	8
" vittatus, Say.....	25
*Rhizophagus cylindricus, Lec.	4

TROGOSITIDÆ.

Tenebrioides mauritanica, Linn.	1
Peltis ferruginea, Linn.....	3
Calitys scabra, Thumb.....	9
Grynocharis 4-lineata, Melsh.	4

BYRRHIDÆ.

Cytillus sericeus, Forst.....	2
Byrrhus cyclophorus, Kirby..	3
" Kirbyi, Lec.....	1

DASYLLIDÆ.

Cyphon variabilis, Thumb ...	4
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ELATERIDÆ.

Adelocera aurorata, Lec.....	2
" oblecta, Say.....	7
" brevicornis, Lec. ..	9
Alaus myops, Fab.....	11
Cardiophorus convexulus, Lec.	1
Cryptohypnus abbreviatus, Say.	5
" tumescens, Lec.	7
Elater pedalis, Germ.....	18
" nigrinus, Payk.....	22
" mixtus, Hbst.....	3
" pullus, Germ.....	14
" vitiosus, Lec.....	14
" senicinctus, Rand....	1
" luctuosus, Lec.....	50
" nigricans, Germ.....	16
" apicatus, Say.....	60
* " phœnicopterus, Germ..	25
Megapenthes stigmatosus, Lec..	1
Agriotes fucosus, Lec.....	21
" limosus, Lec.....	303
Dolopins lateralis, Esch.....	18
Betarmon bigeminatus, Rand.	2
Melanotus castanipes, Payk ..	34
" communis, Gyll...	1
Limonius æger, Lec.....	25
Campilus denticornis, Kirby..	15
Sericosomus incongruus, Lec.	15
Corymbites virens, Schr.....	33
" vernalis, Hentz...	3
* " resplendens, Esch.	17
" spinosus, Lec....	9
" caricinus, Germ..	1
* " mendax, Lec.....	1
" insidiosus, Lec...	13
" falsificus, Lec....	3

Corymbites triundulatus, Rand	59		
" propola, Lec.	15		
" cruciatus, Linn.	62		
" æripennis, Kirby.	150		
" metallicus, Payk.	28		
* " flavipes.	6		
Asaphes memnonius, Hbst.	1		
THROSCIDÆ.			
Drapetes geminatus, Say.	....	
Throscus constrictor, Say	....	3	
* " Chevrolati, Bonv.	2		
BUPRESTIDÆ.			
Chalcophora virginienensis, Drury	13		
" liberta, Germ.	....	1	
Dicerca prolongata, Lec.	....	53	
" divaricata, Say.	....	10	
" tenebrosa, Kirby.	....	37	
" chrysea, Melsh.	....	1	
" tuberculata, Chev.	....	2	
* " lugubris, Lec.	....	3	
Buprestis consularis, Gory.	....	4	
" maculiventris, Say.	....	59	
" fasciata, Fab.	....	207	
* " sulcicollis, Lec.	....	3	
" striata, Fab.	....	25	
Melanophila longipes, Say.	....	80	
" fulvoguttata, Harr.	....	3	
Anthaxia æneogaster, Lap.	....	11	
Chrysobothris femorata, Fab.	....	11	
" floricola, Gory.	....	1	
" dentipes, Germ.	....	5	
" trinervia, Kirby.	....	4	
Chrysobothris scabripennis, Lap. and Gory.	....	1	
* Agrilus granulatus, Say.	....	1	
* " anxius, Gory.	....	2	
" politus, Say.	....	2	
" egenus, Gory.	....	1	
LAMPYRIDÆ.			
Celetes basalis, Lec.	....	2	
Cœnia dimidiata, Fab.	....	1	
Eros aurora, Hbst.	....	39	
Plateros canaliculatus, Say.	....	16	
Calochromus perfaceta, Say.	....	5	
Ellychnia corrusca, Linn.	....	41	
Pyractomena borealis, Rand.	....	4	
Photuris pennsylvanica, Deg.	....	38	
Podabrus modestus, Say.	....	36	
" lateralis, Lec.	....	14	
Telephorus fraxiini, Say.	....	15	
* " Curtisii, Kirby.	....	14	
MALACHIDÆ.			
Collops tricolor, Say.	....	2	
Anthocomus Erichsoni, Lec.	....	1	
Dolichosoma foveicollis, Kirby.	....	1	
CLERIDÆ.			
Clerus quadriguttatus, Oliv.	....	5	
* " nigrifrons, Say.	....	1	
" ichneumoneus, Fab.	....	6	
Thanasimus dubius, Fab.	....	24	
" undulatus, Say.	....	2	
" nubilus, Kl.	....	60	
Thaneroclerus sanguineus, Say.	....	1	
Hydnocera difficilis, Lec.	....	4	
" verticalis, Say.	....	1	
* " tabida, Lec.	....	2	
Chariessa pilosa, Forst.	....	1	
Necrobia violaceus, Linn.	....	7	
PTINIDÆ.			
Dinoderus substriatus, Payk.	....	21	
" cribratus, Lec.	....	1	
CIOIDÆ.			
Rhipidandrus paradoxus, Beauv.	....	2	

(TO BE CONTINUED.)

NOTES ON COLLECTING, AND NAMES NEW TO THE
CANADIAN LIST.

BY J. ALSTON MOFFAT, LONDON, ONT.

The season of 1894 was, in this locality, of rather an unusual character. Spring appeared with March, lasting up to the 25th, when we had a series of light snow-storms and hard frosts, which continued to the 7th of April. Then we had weeks of the most charming, moderate and enjoyable weather. After the middle of May we had frequent thunder-showers; the 28th was cold and snowy, with a killing frost at night. It remained cold to the 7th of June, when it changed to warm weather, and for the rest of June and throughout July we had an almost unbroken time of excessive heat. August was dry as well as hot, and its effects were seen in the coloured leaves of trees and bushes, and much more so in weeds and grasses. In the early part of September rain set in, which freshened vegetation greatly, but frosts followed at the end of the month.

I kept a look-out for *P. cresphontes*, to see if it would be as plentiful as in the previous year. During June I saw a number on the wing. On the 7th of July I got two full-fed larvæ, which matured in due time, but during the remainder of the season I did not see a specimen of *cresphontes* in any stage. Just the reverse of my last season's observations of it.

During the latter part of June and early part of July insect life was in profusion, but a combination of causes prevented me from giving close attention to it, yet I secured several interesting things new to me.

I am indebted to Professors C. H. Fernald and J. B. Smith for the following names, which are new to the Canadian list; excepting the geometer, which was identified by means of Packard's monograph:—

Plusia dyaus, Grote. Taken by Anderson. This seems to be properly a more southerly species; might easily be mistaken for *precatonis*.

Bomolocha citata, Grote. Taken by Anderson. Grote says: "Our smallest species. Expanse, 19 mm."

Bomolocha toreuta, Grote. "Very recognizable from the whitish blotch on internal margin of primaries."—Grote.

Petrophora testata, Linn. I took a single specimen of this handsome insect on the 9th of August, 1894, and diligent search failed to secure another. As an example of "unequal distribution," I will mention that there are now five species of *Petrophora*, represented in the

Society's collection by single specimens, taken by myself, some of them many years ago, and have never met with another specimen of either of them. These are *testata*, *populata*, var. *Packardata*, *prunata*, *cunigerata*, var. *disjunctaria*, *silaceata*, var. *defluata*. They are all European, as well as American.

Elasmopalpus tartarellus, Zell. Anderson.

Exartema micantana, Fernald, M. S. This species I find only in a marshy spot at the east end of the city. I have taken it in considerable numbers during July for three seasons.

Sericoris dealbana, Walk.

" *abietana*, Fern., M. S.

Semasia cineriana, Fern., M. S. I came upon this species resting on the flowers of a purple aster on the 24th of September, 1892. On the 30th I got more, and on the 10th of October yet more. In '93 I saw two, but secured none; in '94 I did not see one; the asters were all dried up before their time for appearing came.

Semasia Goodelliana, Fern., M. S.

Steganoptycha balliana, Fern., M. S.

Ecdytolopha insiticiiana, Zell. The larva of this moth is, in Prof. Fernald's Synonymical Catalogue of N. A. Tortricidæ, reported to be a borer in the stems of locust trees.

Pseudogalleria inimicella, Zell.

Depressaria argillacea, Wlsm.

" *pulvipennella*, Clem.

The two last were taken by Anderson.

We are requested to inform our Canadian subscribers that the Department of Agriculture of Ontario is very kindly issuing bound copies of the combined Reports, for 1894, of the Fruit Growers' Association and the Entomological Society of Ontario. No copy, however, will be sent to any one who has not paid his subscription for the current year. This difficulty may be overcome and the volume secured by at once sending the amount of arrears to Mr. J. A. Moffat, Victoria Hall, London, who will inform the Deputy Minister of Agriculture that such has been done.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

X. THE DYTISCIDÆ (DYTISCINI AND CYBISTRINI) OF ONTARIO AND QUEBEC.

The species included in the above tribes are all large or moderate sized insects, and among them are found those in which the perfection of specialization of the ♂ tarsi reaches the highest pitch. The basal disks on the anterior feet often attain considerable dimensions, while occasionally we find three well-marked sizes of disks on the same foot—as, for example, in *Acilius*. These make beautiful preparations for microscopic study, the method of treating them being as follows: Cut off the leg a little below the knee, and place the severed piece in an aqueous 25% solution of caustic potash for a few days, until it becomes nearly transparent. Then take out of the potash and place in soft water for twenty-four hours, next removing to strong alcohol for about the same length of time. If now placed in oil of cloves for several hours, it is ready to be mounted on a slide in the ordinary way for examination by transmitted light. A great deal depends on carefully watching while in the potash solution; the specimen should not be so dark as to obstruct the light-rays to any very great extent, nor so transparent as to render the overlying parts to be separated with difficulty from the underlying, as in the latter case the chitin is often rendered so pliable as to lose the original form. Each species has its own arrangement of disk bearing hairs by which it may be separated from its congeners, though the resemblance is sometimes very close.

For the sake of convenience, I have included both of the above tribes in one generic table; of the second, the genus *Cybister* is the only representative, the tribal characters being given on page 72.

A. Length, above an inch.

Hind tarsi with one claw, anterior ♂ tarsi with four rows of equal disks.....*Cybister*.

Hind tarsi with two claws, anterior ♂ tarsi with two large and numerous small disks.....*Dytiscus*.

AA. Length scarcely exceeding half an inch.

b. Spurs of hind tibiæ acute at tip.....*Hydaticus*.

bb. Spurs of hind tibiæ emarginate at apex.

c. Elytra either sulcate (♀) or with distinct, closely-placed moderate-sized punctures.....*Acilius*.

cc. Elytra hardly distinctly punctured, sometimes appearing very finely punctulate or partially aciculate.

d. Middle thighs with long, conspicuous setæ. *Thermonectes*

dd. Middle thighs with short, inconspicuous setæ. *Graphoderes*.

The emargination of the tips of the tibial spurs in the last three genera is very fine, and must be looked for with care, and a good lens. The other characters seem sufficiently evident if ordinary discrimination is used.

HYDATICUS, Leach.

Three of these occur, which are distinguished with some difficulty, excepting in the case of well-marked individuals, which separate thus:—
Above rufo-piceous, sides of thorax and of elytra obscurely rufo-testaceous,

.50 in. *piceus*, Lec.

Above piceous, thorax rufous with black basal fascia. Elytra with distinct yellow margin.

Larger (.50 in.). Elytra with margin and usually a basal band from which extend four or five longitudinal lines, fulvous. . . *stagnalis*, Fabr.

Smaller (.48 in.). Elytra with a submarginal yellow vitta, recurved at the humerus and attenuated to the end, which is behind the middle, margin rufous towards the tip. *bimarginatus*, Say.

DYTISCUS, Linn.

Eight species are on the Canadian lists, and are easily known from all other Dytiscidæ, except *Cybister*, by their large size. The sides of the thorax and usually the front and hind margins are yellow, the outer margins of the elytra always so. They separate into groups according to the form of the labrum and of the hind coxal plates, the processes of which extend slightly over the apparent bases of the hind legs, and are divergent and either rounded, simply acuminate, or spinose at tip. The females of some species have sulcate elytra, while others are smooth. The spiracles of all make very pretty objects for the microscope, being protected by dendroid hairs which fringe the margins, and well repay the trouble of preparation. In the following table I have substituted the name *circumcinctus*, Ahr., for *anxius*, Mann., following the opinion doubtfully expressed in the Henshaw Check List.

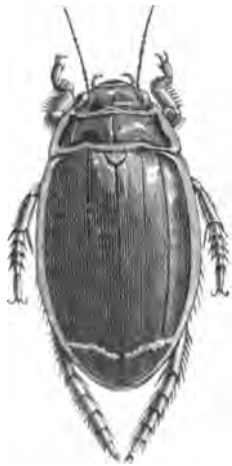


FIG. 11.

- A. Labrum nearly truncate at middle, apices of coxal processes obtuse; thorax with all the margins yellow. 1.60 in. (fig. 11.).....*Harrisii*, Kirby.
- AA. Labrum distinctly emarginate at middle.
- b. Coxal processes not spinose at apex.
- c. Thorax with sides yellow, base and apex not or only indistinctly so.
- d. Body beneath reddish, margins of ventral segments and some other markings black. 1.04-1.25 in.....*fasciventris*, Say.
- dd. Body beneath blackish or piceous.
- Elytral pale margin broad to apex.
1.08 in.....*hybridus*, Aubé.
- Elytral pale margin narrowing to apex
and with oblique subapical fascia.
1.28-1.35 in... ..*verticalis*, Say.
- cc. Thorax with all the markings distinctly and usually rather broadly yellow.
- Coxal processes blunt at tip. 1.20 in...*sublimbatus*, Lec.
- Coxal processes acuminate. 1.32 in...*marginalis*, Linn.
- bb. Coxal processes spinose at apex.
- Entirely pale beneath except the middle
of the metasternum. 1.28 in.....*circumcinctus*, Ahr.
- Under side with black markings on margins of
ventral segments and on metasternum.
- : 1.25-1.40 in.....*dauricus*, Gebl.

ACILIUS, Leach.

The two known from Canada both have females with sulcate elytra, though *fraternus* has also a smooth form. They separate with difficulty, the main characters being these:—

Fulvous above, head with base and an M-like mark on the vertex black; thorax with two transverse black lines, the anterior larger. Elytra closely irrorated with black dots and with subapical yellow fascia, posterior femora slightly suffused with black at base. .50-.56 in. (fig 12.) *semisulcatus*, Aubé.

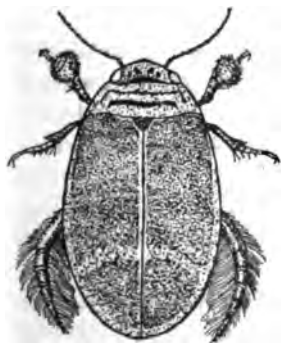


FIG. 12.

Darker, slightly larger, more densely punctured; the mark on the vertex is not defined, the thoracic lines are broader and the femora nearly black. The sulci of the ♀ elytra are more abbreviated at base, while in the ♂ the tufts of hair on the inner edge of the three basal joints of the intermediate tarsi are much less developed than in *semisulcatus*. *Fraternus*, Harr.

THERMONECTES, Esch.

Only one Canadian form, *T. basilaris*, Harr., a somewhat convex beetle, blackish above; head with the front and a transverse line on the vertex fulvous, thorax with sides and a median transverse line of the same colour. Elytra with the external margin, a sub-basal fascia and some vague irrorations yellowish. .36-.40 in.

GRAPHODERES, Esch.

Thorax fulvous, black on anterior and posterior margins; head yellowish, the occiput and an M-like mark black. .50 in. *cinereus*, Linn. Smaller, testaceous, beneath rufous; head in front, sides of thorax and of elytra yellowish. .46 in. *liberus*, Say.

According to late authorities, the name *fasciatocollis* should give way to *cinereus*, and I have accordingly used the latter.

CYBISTER, Curt.

One very large insect, *C. fimbriolatus*, Say, represents the genus with us. It is of ovate form, nearly black, but with a greenish cast, the sides of the thorax and elytra with a broad yellow margin. In the ♀ the wing covers and thorax are finely strigose with short lines, the sutural region smoother. Length, about 1.20 in.

The following are the titles of the more important works treating of the American forms of the Dytiscidæ and Haliplidæ. All have been freely used in the preparation of the foregoing pages:—

1838. Aubé., Ch. *Spécies général des Hydrocanthares et Gyriniens*. Paris.

1855. Leconte, J. L. Analytical table of the species of *Hydroporus* found in the United States, with descriptions of new species. *Proc. Acad. Nat. Sci., Phila., VII.*, pp. 290-299.

1862. Leconte, J. L. Synopsis of the species of *Colymbetes* inhabiting America north of Mexico. *Proc. Acad. Nat. Sci., Phila.*, pp. 521-523.

1873. Crotch, G. R. Revision of the Dytiscidæ of the United States. Trans. Am. Ento. Soc., IV., pp. 383-424.
1882. Sharp, David. On Aquatic Carnivorous Coleoptera or Dytiscidæ. Trans. Royal Dublin Soc., II., Ser. 2, pp. 179-1003.
1883. Horn, G. H. Miscellaneous Notes and Short Studies of North American Coleoptera. Trans. Amer. Ento. Soc., X. (Dytiscidæ, pp. 276-284).

ON TWO NEW SPECIES OF PLATYCERUS.

BY THOS. L. CASEY, U. S. A., NORFOLK, VA.

I am scarcely warranted in attempting a detailed table of this genus, because a number of species are known to me only by a single sex ; but in looking over the material, it can be readily perceived that there are two sections, the first represented by *quercus*, *oregonensis* and *depressus*, being characterized by great sexual differences in the mandibles, and the second, represented by all the other species, having the mandibles unmodified in the male. The second section may be divided into three groups : the first, represented by *Agassii*, *pacificus* and *parvicollis*, which, judging by analogy, have the hind tarsi long and slender in both sexes ; the second, composed of *californicus* and *thoracicus*, having the hind tarsi short, at least in the female ; and the third, with stout and triangular tibiae, at present represented by *Keeni* alone.

The name of this genus is changed in the recent Catalogue of European Coleoptera, to *Systemocerus*, Weise, but while admitting the validity of the change, I do not think that *Platycerus* should include the species called *Lucanus*, by Scopoli and others, because it is probable that Geoffroy did not describe any species under the name *Platycerus*, and the genus *Platycerus*, Geoff., should therefore be regarded as not published. I have not been able to consult the original work of Geoffroy, however, and am not certain that my premises are correct.

P. Keeni, n. sp.—Body very stout, convex, polished, blackish-castaneous in colour. Head small, coarsely and confluent punctate, two oblique subelevated areas of the occiput subimpunctate ; mandibles very small, the internal tooth at the middle small and broadly triangular ; antennæ short, rufo-testaceous, the scape slightly longer than the funicle, the latter compact, the three outer joints increasing gradually in width but not prolonged ; club short, abrupt, compact, not so long as the funicle, three-jointed, the first abruptly, more than twice as wide as the last joint

of the funicle, more than twice as wide as long and a little wider than the second, third with a broad sensitive terminal button. *Prothorax* large, one-half wider than long, widest and narrowly rounded at the middle; sides feebly sinuate toward base, very strongly so when viewed sublaterally; apex broadly, feebly sinuate, much narrower than the base and scarcely more than one-half as wide as the disk, the latter convex, coarsely, sparsely punctate, the punctures closer near the apex, the surface rapidly declivous laterally, the side margins not reflexed. Scutellum well-developed, densely punctate. *Elytra* scarcely one-third longer than wide and but slightly more than twice as long as the prothorax, at base equal in width to the disk of the latter; humeri exposed, obtusely angulate; apex very broadly rounded; disk sparsely, moderately coarsely punctate, the punctures uneven in arrangement, with scarcely any trace of punctured series, alternate intervals subcostiform. *Legs* moderate in length, very stout; femora coarsely, sparsely punctate; tibiae triangular, very stout, coarsely, asperately punctate and seriatly setose; tarsi short and stout, the posterior much shorter than the tibiae. *Hypomera* setose. Length, 12.5 mm.; width, 5.7 mm.

Queen Charlotte Island.

Though somewhat allied to *californicus*, this species is readily distinguishable by its larger size, obese form, subcostulate elytra and very stout legs. The bilaterally symmetrical club may possibly be a sexual character, as I am under the impression that there is a specimen of *californicus*, in the cabinet of Mr. Rivers, having a similar antennal character; if so, the hind tarsi of the *californicus* group are short in both sexes.

This interesting species was discovered by Rev. J. H. Keen, and the original specimen kindly given me for description by Mr. Wickham, with permission of Mr. James Fletcher, of Ottawa. It has recently been taken in abundance.

P. thoracicus, n. sp.—Stout, convex, moderately shining, black, with a scarcely visible piceous tinge. *Head* small, coarsely, confluent punctate, a median area at base subimpunctate; mandibles very small; antennae short, black, the scape slightly longer than the funicle, the latter a little longer than the club, with the joints compactly joined, the sixth scarcely wider and not inwardly prolonged; club in great part sensitive, the two basal joints about twice as wide as long, more developed internally, the last transversely ovulate and eccentrically attached. *Prothorax* large, one-half wider than long, widest and more strongly rounded.

at basal third; sides rapidly convergent toward base and deeply sinuate at the basal angles, the latter right; apex feebly sinuate, but slightly narrower than the base and two-thirds as wide as the disk, the latter feebly impressed along the basal margin, feebly explanato-reflexed at the sides, and coarsely, very closely punctate, the punctures sparser near the centre. *Elytra* nearly one-half longer than wide, distinctly more than twice as long as the prothorax, at base not as wide as the disk of the latter; disk coarsely, not very closely, unevenly punctate, with tolerably uniform but unevenly impressed series of coarser punctures. *Legs* moderate in length, rather slender; femora remotely punctate; tibiae slender, not much wider at apex, with impressed series of asperate punctures, seriatly setose; tarsi short, stout, but slightly more than one-half as long as the tibiae. Hypomera coarsely and scarcely confluent punctate, very inconspicuously setose. Length, 11.0 mm.; width, 5.0 mm.

California.

Differs radically from *Keeni* in the structure of the antennal club and tibiae. It is related to *californicus*, but differs conspicuously in its obese form and larger prothorax, and also in its coarser and much denser sculpture throughout. The types of both this species and *Keeni* are apparently females.

NOTES ON HYMENOPTERA.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

The advent of another collecting season finds me with a very large proportion of my last year's captures still undetermined, and in many instances even unexamined. A few remarks, however, in regard to my success with the Hymenoptera may induce some of our younger members to pay more attention to this order. Probably 500 species were collected, a large proportion of which were of the smaller forms, and it seemed, indeed, that many of the larger species were much less numerous than in some seasons. Special attention was given to the collection of the micro-hymenoptera, for these are so poorly represented in Canadian collections. In making a rough summary of the species, I find about 125 species belonging to the *Aculeata*, and 100 to the *Phytophaga*, the remainder being distributed among the different families of parasitic forms. There are many interesting additions to my collection, and many gaps have been filled in. Mr. Ashmead's monograph of the *Proctotrypids* has made it abundantly evident that the knowledge of the

Canadian species was very limited, and I made a special effort to obtain as many examples as possible. I took altogether about 350 specimens, and now find that over 50 species are represented. This will give any collector an idea of what he may expect to secure if he have the necessary patience to preserve and mount so much small and inconspicuous material. In separating my species I have found most difficulty with the sub-family Belytinæ, in which several of the genera have proved stumbling-blocks, which I attribute, however, to my deficient study of them, and not to any lack in the excellent work of Mr. Ashmead. As some of the species are still undetermined, a list would be imperfect, but the genera represented are as follows:

Isobrachium, *Anoxus*, *Perisemus*, *Goniozus*, *Gonatopus*, *Phorbas*, *Lygocerus*, *Megaspilus*, *Ceraphron*, *Aphanogmus*, *Telenomus*, *Prosacantha*, *Hoplogryon*, *Gryon*, *Caloteleia*, *Macroteleia*, *Hoploteleia*, *Scelio*, *Proctotrypes*, *Leptorhaptus*, *Acropiesta*?, *Belyta*?, *Oxylabis*, *Cinetus*, *Pantoclis*?, *Zygota*, *Aclista*?, *Spilomicrus*, *Paramesius*, *Aneurhynchus*, *Galesus*, *Loxotropa*, *Tropidopria*, *Diapria*, *Ceratopria*, *Phænopria*, *Basalys*, *Polymecus*, *Isocybus*, *Helorus*.

Among the additions to the Canadian fauna are the following:—

Isobrachium myrmacophilum, Ashm., ♂; *Anoxus Chittendenii*, Ashm., ♂; *Goniozus foveolatus*, Ashm., ♂; *Gonatopus flavifrons*, Ashm., ♀; *Phorbas laticeps*, Ashm., ♀; *Caloteleia Marlattii*, Ashm., ♂ ♀; *Macroteleia virginensis*, Ashm., ♀ ♂, and *Hoploteleia floridana*, Ashm., ♀.

I have recently had the pleasure of examining a small collection of Hymenoptera made by Mr. William Metcalfe, of Toronto, and which contained a few species not yet taken at Ottawa, and several others which are rare. Mention may be made of *Cræsus laticulus*, Nort., ♀; *Nematus similis*, Nort., ♀ (the Locust saw-fly); *Sciapteryx punctum*, Prov., ♀; *Macrophya pulchella*, Klug., ♀; *Pamphilius ruficeps*, Hargtn., ♀; *Xyela minor*, Nort., ♂ ♀; *Ibalia maculipennis*, Hald., ♀; *Ichneumon hospitis*, Cress., ♀; *Mesostenus sagax*, Prov., ♀; *Cteniscus annulipes*, Cress., ♀; *Xylonomus canadensis*, Hargtn., ♀; *Isobrachium myrmacophilum*, Ashm., ♀; *Tachytes crassus*, Patton, ♀?; *Philanthus ventilabris*, Fabr., ♀; *Euspongus bipunctatus*, Say, ♀; *Ceratina tejonensis*, Cress., ♂.

The last species is much like small specimens of *C. dupla*, Say, but seems to be distinct by the strongly angulated femora. It has been recorded by Provancher (*Faune Entomologique*, Vol. II., p. 812), who received two specimens from Mr. Brodie, of Toronto.

EUDRYAS STÆ. JOHANNIS REDIVIVUS.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

Readers of the CANADIAN ENTOMOLOGIST will recall the controversy between Prof. Smith and myself as to the species described by Walker as *Eudryas Stæ. Johannis*, the type of which was examined in 1867 by Grote & Robinson, and pronounced a distinct species allied to *grata*. I had supposed the insect owed its name to the St. John's River, Florida, but, according to Mr. Smith (C. E., XXIV., 133), the type bore a label that it was taken on a church door in England. Mr. Smith, relying on the label, invented the theory that: "in some way the pupa of the insect was transported to England, and through the vicissitudes encountered an aberration was produced." This writer has "no hesitation in referring the species as a suffused aberrant *grata*." There is *no* band on the hind wings, but, nevertheless, it is set down as a "suffused" specimen of *grata*, which always, so far as known, *has* a band! For my answer to this, see my paper, CAN. ENT., XXV., 320, where, aided by Mr. Tutt's memoranda as to the given English locality on the label, I discussed the *pro* and *con.* of the above theory. Now I am in receipt of a letter from Mr. Schaus, that *Eudryas Stæ. Johannis* has been re-discovered in Mexico. My kind correspondent writes: "It will interest you to know that I have recently seen several specimens of *Eudryas Stæ. Johannis*, Walk., from Mexico; they were sent to Mr. Druce by a native who is now collecting." Thus the theory of the "vicissitudes of the voyage" vanishes; the specific validity of *Stæ. Johannis* asserted by us in 1868, before Mr. Smith was (entomologically speaking) born, is vindicated. But more than this: the sequel shows that, instead of adopting the more credible theory that Walker's "type" had in some way been provided with a label belonging to a different specimen, Mr. Smith thought it "probable that in some way the pupa of the insect was transported to England." Having pinned his faith to the label, Mr. Smith then constructed the theory of "suffusion" to account for the differences, and then invented the "vicissitudes of the voyage" to account for the "suffusion." I think it is now plain that sufficient proof is offered that Mr. Smith blindly accepts a label, and that this throws light upon his work in his recent Catalogue, where he has accepted whatever Mr. Butler showed him as being Walker's "types"; whereas the fact is, that Walker did not label his "types" as such, and the specimens now so designated have been shifted and sorted out by Mr. Butler. I have offered evidence that the specimens now shown as the

"types" of *Acronycta cristifera*, *Xylina signosa*, *Hormisa absorptalis*, are not the specimens seen in their original position by myself, Prof. Fernald, and Grote & Robinson. Probably other cases exist. The basis of a specific name is found in literature, not in a collection or a supposed "type." A label may be changed or lost, a specimen may be substituted; the description is clearly the only warrant for the name that cannot be altered. The manner in which Mr. Smith speaks of Walker's and Gueneé's "types," as if he knew anything certain about the specimens shown him as such, his neglect in each and every case to compare the British Museum "type" with the Lists, stamps his method, pursued in the "Catalogue," as uncritical, if not "unscientific." Mr. Smith has made a number of remarks based on the fact that, in Mr. Neumoegen's collection, I am supposed to have labelled some specimens (from memory) of difficult Agrotids wrongly. If the fact is really so, these determinations were never intended to be published, but the magnitude of my fault, amplified by Mr. Smith, really pales before the fact that, in the "Revision," Mr. Smith unites my *cupidissima*, *orbis* and *latula*, and invents another *Eudryas* *Stæ. Johannis* theory (p. 25), that I had "confounded two distinct species, one with open orbicula and one with closed"; while in the Catalogue, after seeing my types, he separates as distinct the three species (p. 56), and abandons the positively stated theory of the "Revision" without a word of apology.

But though the mystery of *Stæ. Johannis* is now cleared up, as to the home of the species, and its undoubted validity, the "type" in the British Museum is still without a certain locality. If *Stæ. Johannis* is found in Mexico, may it not be found on the banks of the St. John's River, in Florida, also? Is it not now somewhat probable that the "type" was really collected there by Doubleday? At any rate, Florida collectors will do well to look for the species, which belongs apparently to the Tropical fauna of America north of the Equator. We have, then, three allied species of the genus forming a group by themselves: *grata*, Fab.; *Stæ. Johannis*, Walk., and *cypripis*, Grt. As to the name for the genus, I have given the argument. No one living, probably, regrets more than I do that, in the strict letter of the law, we must abandon the beautiful Wood Nymph for *Euthisanotia*, and use for *timais*, according to Berg's restriction, the name *Xanthopastis*. Thus the type of *Euthisanotia* would be *unio*, and with this, *brevipennis*, Stretch, from California, seems strictly congeneric. I wish Mr. Dyar would examine *Stæ. Johannis* and *grata*, to see if this group offers any structural distinctive characters,

REMARKS ON APATELODES SUGGESTED BY AN ARTICLE
BY MR. SCHAU.

BY HARRISON G. DYAR, A. M., NEW YORK.

Mr. Schaus, in describing some new species of South American moths (Proc. Zool. Soc., Lond., 1894, p. 233), casually refers the genus *Apateles* to the *Eupterotidæ*. As this genus has been placed among the *Notodontidæ* by American authors, it may be worth while to examine the arguments for this position.

The *Eupterotidæ* of Hampson are a series of mostly large moths from India, with geometriform markings, of a peculiar and rather characteristic appearance. The body is proportionately rather small and slender, and the fringes of the wings are long. Their hairy vestiture, broad wings and short cell suggest the *Lasiocampidæ*, where they are placed by Kirby. They are, however, frenate, and with the venation essentially of *Notodontidæ*, but without the accessory cell. Two genera, at least, are included (*Gangarides* and *Cnethocampa*), which differ considerably in habitus. In these, the body is stouter proportionately, the wings are narrower and the cell longer, while the general appearance suggests the *Notodontidæ* rather than the other *Eupterotidæ*. Mr. Hampson separates these families by the absence of the tongue in the *Eupterotidæ*; but, as this member seems to be equally lacking in the *notodontian* *Melelepha* (*Ichthyura*), the separation seems hardly very sharp.

Of the larvæ, I only know those of *Cnethocampa* (*Thaumetopœa*, Hubn.). Unfortunately, these belong to the atypical section just referred to, and it is hardly fair to judge the *Eupterotidæ* by these. Very little can be positively made out from figures, usually; though that of the larva of *Eupterota fabia* seems to exhibit the same type of structure as *Cnethocampa*. Judged on these data, the larval *Eupterotidæ* belong to the *Lymantriid* section of the *Noctuina*, characterized by the presence of warts, three warts above stigmal wart on the last two thoracic segments. They differ from the *Lymantriidæ* by the reduction of wart v. instead of iv. and the presence of secondary hairs.

To turn now to *Apateles*. In *angelica* there is a little accessory cell on a long stalk; but in *torrefacta* there is none, and veins 7-8 and 9-10 arise as two pairs from a short furcation of the long stalk from apex of cell. The hind wings are frenate and the tongue is wanting. The habitus is not that of the typical section of the *Eupterotidæ*, but there is

nothing positive to distinguish it from the other group represented by *Gangarides* and *Cnethocampa*.

The larva of *torrefacta* certainly possesses a fine development of secondary hairs; but so does *Datana* and, to a less degree, *Malalopha*. Unfortunately, the secondary coating is so well developed that the warts, even if present, are obscured, and I cannot make out their arrangement on the thorax. On the abdomen, the pale spots representing the wart areas rather suggest the retaining of wart iv. at the expense of v.; but the character is so faint that nothing definite can be argued from it.

Thus we see that nothing at present contradicts the position assigned to *Apatelodes* by Mr. Schaus; though, on the other hand, nothing positive confirms it. Shall we add the family Eupterotidæ to our lists on this evidence?

I would like to remark that if it should turn out, as I now suspect, that the Lasiocampidæ belong to the Lymantriid section of the Noctuidæ, and that Mr. Schaus is right in assigning *Apatelodes* to the Eupterotidæ, then the close resemblance of *A. angelica* larva to a lasiocampid, to which I have referred [See Ann. N. Y. Acad. Sci., Vol. VIII., p. 229], may be better understood.

A FEW POINTS IN COLLECTING ICHNEUMONIDÆ.

BY G. C. DAVIS, AGRICULTURAL COLLEGE, MICH.

The Ichneumonidæ have habits and peculiarities as distinctly their own as other families and orders of insects. In collecting them one will find, after a little experience, that certain species or even groups will frequent certain places where conditions are favourable and their host is likely to be found.

The *Pimplina*, with long ovipositors, should be sought for in a wooded region around dead or diseased wood, where their hosts, the borers, are at work. One of the best places I have found for collecting them is around piles of dead block-wood cut the preceding winter. They are most common in Michigan in June and early July. *Xylonomus* and *Grotia* may often be found as pupæ in the hollow stems of shrubs in the spring, where they have already destroyed their host and are securely wrapped in a papery case of their own. The portion of the subfamily with shorter ovipositors, such as *Pimpla* and *Glypta*, apparently work on caterpillars, and are quite as common during the fall as in the summer. The *Ophionina* are much the most common in the fall. The

Ichneumonina and *Cryptina* are the earliest to appear; in fact, I have taken many hibernating specimens of *Ichneumon* and *Amblyteles* safely stored away amid the frost, in some old rotten log or under loose bark.

In collecting species of *Ichneumon*, *Cryptus* and *Ophionina*, I have had my best success by collecting along a dense, moderately high hedge-fence, and amongst bushes and low trees bordering a forest or a swamp. A person will succeed much better if he will select one spot and watch the specimens as they pass him, rather than to keep constantly on the move. Sometimes better success will come from selecting several spots not far from each other, and collecting alternately from each one.

Three years ago this season I accidentally happened on a little ruse that has since yielded me many rare specimens that otherwise I am sure I should never have obtained. It is merely trampling down a few of the bushes in some spot on the edge of the thicket where one wishes to collect. As an *Ichneumonid* comes along, it will almost invariably make a slight halt over or near the trampled vegetation. The halt, though hardly noticeable, is sufficient for one to scoop the specimen with the net. The rare *Ichneumon albomarginatus*, Cr., is such a shy and rapid flyer that I was never able to capture one until this method was used. The *why* of this method is probably explained by the fact that the bruised plants give off a similar odour to what they would were they eaten by some caterpillar, and the parasite halts to look for the cause of the odour.

Late in the autumn, after frosts have killed the flowers, and larvae have mostly pupated, I have been very successful in collecting *Tryphonina* and other *Ichneumonidae* on a little isolated group of larches, located on our college grounds. The parasites and wasps found something to feed upon that attracted them for at least two weeks. There were no plant-lice to be found, and apparently it was the pitch or resin.

The wingless *Pesomachus* I have most commonly found on herbaceous plants in waste places. The best method of securing them is by sweeping. A collector may have fair success in sweeping for other parasites, especially the smaller species, but generally his catch will consist mostly of the commoner species. With a little practice, a collector will accustom his eye so that he will readily spy even the minute *Ichneumonids* as they approach him on the wing. Of course, rearing parasites is a very desirable way of obtaining them, but we must both rear and collect if the greatest progress is to be made.

PRELIMINARY STUDIES IN SIPHONAPTERA.—V.

BY CARL F. BAKER, FORT COLLINS, COLO.

Genus Pulex (Division III.)

TABLE OF SPECIES.

- A. Head gently and evenly rounded from occiput to mouth; eyes in anterior half of head, about equally distant from upper and lower edges; antennal groove in middle of head; mandibles reaching two-thirds of anterior coxæ.....B.
- AA. Head more or less distinctly angled in front above, not evenly rounded from occiput to mouth; head combs of 5 to 6 spines; in anterior tarsi joint 1 equals 3; in middle tarsi joint 2 a little shorter than 5; in posterior tarsi joint 2 equals 5 and as long as 3 and 4 together, while 1 is one-half longer than 2; abdominal segments with one row of bristles above and below; posterior femora with a row of bristles on the side.....D.
- B. Abdominal segments above each with three rows of bristles, each row with 8 to 12 bristles on either side, below two rows, the first with 4 to 7, the second with 6 to 7 bristles on either side; eye small; bristles on joint 2 of antennæ as long as joint 3; maxillary palpi in female with joint 2 two-thirds of 4, and 3 about one-half of 4; labial palpi 5-jointed; head combs with 1 or 2 spines on either side; pronotal comb of 20 spines; in middle tarsi joint 2 three-fifths of 1, 2 one-fourth longer than 5, 5 more than twice 4, and 1 as long as 3, 4 and 5 together; in posterior tarsi joint 1 as long as 2 and 3 together; 5 a little more than one-third of 1, while 2 is more than 3 and 4 together, and more than 4 and 5 together; apical spine on joint 2 of hind tarsi shorter than joint 3; posterior femora without a row of bristles on the side; colour, light reddish-brown; length: female, 4 mm.....*gigas*.
- BB. Abdominal segments above each with one row of bristles, 5 to 8 on either side; below one row of 2 to 4 bristles on either side; eye very large; bristles on joint 2 of antennæ shorter than joint 3; maxillary palpi with joint 2 about equalling 4, and 3 two-thirds of 4; labial palpi 4-jointed; in anterior tarsi joint 3 three-fourths of 2, 5 about two and one-half times 4, and less than 1 and 2 together; in middle tarsi 2 one-half longer than 1, 5 two and one-half or three times 4, 1 about equalling 3; in posterior tarsi joint 5 more

- than one-half of 1, 2 as long as 3 and 4 together ; posterior femora with a row of bristles on the side.....C.
- C. Head combs of 6 to 9 spines, pronotal comb of 14 to 18 spines ; in anterior tarsi joint 3 about equals 1 ; in middle tarsi 2 equals 5 or less ; in posterior tarsi 1 as long as 2 and 3 together, and 2 less than 4 and 5 together ; apical spines on joint 2 of hind tarsi as long or longer than joint 3 ; male claspers oval, the broad portion pointing up and back, thickly finely haired around the upper end ; colour, dark brown above, lighter below ; length : female, 2.5-3 mm. ; male, 1.5-2 mm. *serraticeps*.
- CC. Head combs of 2 to 3 spines, pronotal comb of 6 spines ; in anterior tarsi joint 3 longer than 1 ; in middle tarsi joint 2 one-fifth longer than 5 ; in posterior tarsi 1 about one-third longer than 2, 2 one-fourth longer than 5 ; apical spine on joint 2 of hind tarsi longer than joints 3 and 4 together ; male claspers inverted shoe-shaped, the toe pointing backward, moderately hairy above ; colour, dark brown ; length : female, 3 mm. ; male, 2.5 mm. *erinacei*.
- D. Maxillary palpi with joint 2 as long as 3 and 4 together, and 3 three-fourths of 4 ; head obtusely angled in front above ; eye large, at the middle, and nearer the upper than the lower edge ; antennæ in posterior half of head ; bristles on joint 2 as long as joint 3 ; labial palpi 4-jointed ; mandibles reaching to end of anterior trochanters ; pronotal comb of 16 spines ; in anterior tarsi joint 3 three-fourths of 2, 4 shorter than 3, 5 as long as 2, 3 and 4 together ; in middle tarsi 3 slightly longer than 4, 1 much longer ; apical spine on second joint of posterior tarsi longer than joints 3 and 4 together ; dorsal rows of bristles on abdominal segments with 5 to 8 bristles on either side, ventral with 2 to 4 on either side ; male claspers as in *erinacei*, except not so rounded, and very thickly hairy above ; colour, dark brown ; length : female, 1.75-2.25 mm. ; male, 1.5 mm. *inaequalis*, n. sp.
- DD. Maxillary palpi with joints of equal length ; head sharply angled in front above ; eye moderate, in anterior half of head, and about equally distant from upper and lower edges ; mandibles reaching to two-thirds of anterior coxæ ; pronotal comb of 12 spines ; in anterior tarsi joint 5 nearly as long as 2, 3 and 4 together ; in middle tarsi 3 as long as 4, 1 a little longer ; male claspers narrow, curved backward, thickly haired above ; colour, yellowish brown ; length, 2 mm. *goniocephalus*.
- Pulex gigas*, Kirby.

1837. Kirby, Faun. Boreali-Amer. IV., p. 318, pl. 6, fig. 9 (*P. gigas*).

I have referred to this species, specimens taken on cotton-tail rabbit at Lansing, Michigan. The spines on the cheeks are easily overlooked,

and often broken entirely off. It is one of the largest and most well-marked of the known North American fleas. Ritsema, to whom the species was unknown, suggested that it might possibly be identical with *Hystrichopsylla obtusiceps*. This was, however, merely a guess, as it does not bear the slightest resemblance to that species. It was originally described from specimens taken in Canada.

Pulex serraticeps, Gervais.

1832. Duges, Ann. d. Sci. Nat. XXVII., p. 157, pl. 4, fig. 2, 5-9 (P. canis).

1835. Bouche, Nov. Act. Acad. Leop. Carol. XVII., 1, p. 505 (P. felis).

1844. Gervais, Hist. Nat. des Insectes. Apteres. III., p. 371, pl. 48, fig. 8 (P. serraticeps).

This is the common cat and dog flea, well-known from all parts of the world. Besides various wild cats and dogs, it has been reported from *Herpestes ichneumon*, *Foetorius putorius*, *Hyaena striata*, *Lepus timidus*, and *Procyon lotor*. It is also stated to occasionally sip human blood. I have specimens from various parts of North America, and also from Europe.

Pulex erinacei, Bouche.

1835. Bouche, Nov. Act. Acad. Leop. Carol. XVII., 1, p. 507 (P. erinacei).

I have received a series of specimens of this species from Dr. Taschenberg, taken in Germany on *Erinaceus europeus*, which is the only known host.

Pulex inaequalis, n. sp.

Mr. A. B. Cordley sent me a series of specimens of this species taken on cotton-tail and jack rabbits, near the Grand Canon in Arizona. It seems to be the North American representative of *goniocephalus*, but differs very widely from that species as described and figured by Dr. Taschenberg. A variety of this species, which I will call var. *simplex*, occurs on a species of *Lepus* in Michigan. It may eventually prove to be a good species, but it bears such a close resemblance to *inaequalis* that I cannot at this time recognize it as more than a variety of that species. The slightly larger size, 2.5 mm., the head combs of 8 spines, and the pronotal comb of 14 spines, will separate it from the typical form, while the proportions of the tarsal joints and other details are nearly identical.

Pulex goniocephalus, Taschenberg.

1880. Taschenberg, Die Flohe, p. 82, pl. III., fig. 20 (P. goniocephalus).

Recorded from Europe as occurring on hares and rabbits, *Capra ibex*, and *Canis vulpes*.

[TO BE CONTINUED.]

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No. 7.

LIST OF COLEOPTERA COLLECTED AT MASSETT, QUEEN CHARLOTTE ISLANDS, B. C.

BY REV. J. H. KEEN.

The beetles enumerated below were all taken within a circle of five miles' radius from Massett, on the Northern Shore of Graham Island—the most northerly of the Queen Charlotte group. This area, though small, is considerably diversified, and favourable to coleopterous life. The island here is flat, and covered with a forest of spruce and hemlock, with a sprinkling of alder. The soil is sandy, and for the most part dry. The coastline includes a stretch of level sand reached only by the highest tides, and strewn with driftwood; a protected pebbly beach and a tract of rough stones, also covered by the high tides. The sandy beach I find most productive, many even inland insects appearing to fall on the loose sand, and, being unable to rise, crawl for shelter under the driftwood. Hills and fresh-water streams (of any size) are absent, and I quite expect these situations, which occur in other parts of the island, to yield, when examined, several additional species.

These islands enjoy a temperate, though extremely humid, climate. Sunshine is rare, rain of almost daily occurrence. Snow seldom falls in any quantity, and usually disappears quickly. Once in six or eight years the thermometer falls to zero; usually, however, a few degrees of frost mark the extreme of cold. No regular meteorological record is, I regret to say, kept here.

As intimated above, this list does not pretend to exhaust the Coleoptera of the locality; indeed, fresh species are still constantly occurring. It has been thought well, however, to print the list as it at present stands, and to supplement it with another at a later date.

I should like to express here my great indebtedness to my friend, Mr. James Fletcher, of Ottawa, as well as to the learned specialists whose aid he has enlisted in the preparation of this list. Mine has been simply the easy and pleasant work of collecting the specimens; their's, the diffi-

cult and complicated task of determining and collating them. Bearing this in mind, the reader will find no difficulty, in rightly apportioning whatever commendation he may have to bestow.

[The extremely interesting collection of Coleoptera, of which the following list gives the names of those species up to the present identified with certainty, has been made by the Rev. J. H. Keen during the past three years. It was hoped to have published with each species extensive notes and figures of several new to science which Mr. Keen has discovered; but this proves to be impossible just now. As so little is known of the fauna of the Queen Charlotte Islands, every care has been taken to ensure the correct identification of the species. Thanks are particularly due to the following specialists who have given much time to examining and naming the different species and comparing them with Eastern forms:—Dr. J. Hamilton, Dr. C. V. Riley, Mr. L. O. Howard, Dr. Geo. H. Horn, Capt. T. L. Casey, Mr. H. F. Wickham, and Mons. A. Fauvel, of Caen, France. Figures (now in course of preparation) and descriptions of new species, together with fuller notes of the rarer species, will appear later. The numbers given are those of Henshaw's list.—J. FLETCHER.]

- 96. *Cychrus marginatus*, Fish.—Not uncommon.
- 96. *Cychrus marginatus*, Fish., var. *Fulleri*, Horn.—Common under logs in woods from May onwards. Several times taken in act of feeding on snails.
- 106. *Cychrus tuberculatus*, Har.—Frequent under logs from April onwards.
- 169. *Loricera 10-punctata*, Esch.—Rare. In moss near lake in February.
- 176. *Notiophilus sylvaticus*, Esch.—Occasionally under logs in warm, dry places.
- 180. *Leistus ferruginosus*, Mann.—Occasionally under rotten bark of prostrate logs.
- 184. *Nebria diversa*, Lec.—Numerous in spring with *N. Sahlbergi* under driftwood on beach.
- 195. *Nebria Sahlbergi*, Fish.—Frequent under logs on beach from May onwards.
- 221. *Dyschirius 3-dentatus*, Lec.—Numerous on gravelly beach at high-water mark in June.
- 315. *Bembidium erasum*, Lec.—Not common. Ground, July 22, 1891.
- 375. *Bembidium indistinctum*, Dej.—Numerous on sandy banks of salt inlet.

425. *Bembidium spectabile*, Mann.—One specimen.
426. *Bembidium oblongulum*, Mann.—Scarce. Under logs at edge of ponds.
484. *Trechus ovipennis*, Mots.—Not common. Under logs on beach
500. *Pterostichus crenicollis*, Lec.—Common from April onwards.
503. *Pterostichus validus*, Dej.—Not rare.
508. *Pterostichus amethystinus*, Dej.—Common. Seen *in cop.* February 26th.
509. *Pterostichus castaneus*, Dej.—Rare. Under bark.
583. *Pterostichus Luczotii*, Dej.—Common all summer on grassy beach.
653. *Amara scitula*, Zimm.—One only in June.
657. *Amara impuncticollis*, Say.—Abundant.
670. *Amara interstitialis*, Dej.—Rare.
1164. *Tachycellus nigrinus*, Dej.
1168. *Tachycellus badiipennis*, Hald.—Not rare; in grass tufts.
1275. *Bidessus affinis*, Say.—Very common.
1349. *Hydroporus tartaricus*, Lec.—Occurs sparingly.
1352. *Hydroporus tristis*, Payk.—Abundant throughout year. Seen *in cop.* on March 25th.
1379. *Ilybius subæneus*, Er.—Common.
1422. *Agabus æruginosus*, Aubé.—Common.
1459. *Rhantus binotatus*, Harr.—Common.
1474. *Colymbetes exaratus*, Lec.—Occasional.
1492. *Acilius semisulcatus*, Aubé.—Occasional.
1529. *Gyrinus picipes*, Aubé.—Numerous in ponds from May onwards.
1551. *Helophorus inquinatus*, Mann.—Under driftwood in sandy beach, 23rd May, 1893.
1646. *Hydrobius scabrosus*, Horn.—Not rare; on submerged logs in running streams.
1653. *Hydrobius fuscipes*, L.—Very rare. May. Shallow ponds.
1665. *Cercyon fimbriatus*, Mann.—Abundant in rotten sea-weed, June—August.
1676. *Cercyon adumbratus*, Mann.
Cercyon humeralis.—Common in decaying grass. On wing during March and April.
1670. *Cercyon fulvipennis*, Mann.
1680. *Cercyon analis*, Payk.—Frequent under excrement in summer.
Cercyon lateralis, Marsh.—Common.

1692. *Leptinus testaceus*, Müll.—From a living shrew, September 9, 1892.
1701a. *Necrophorus Melsheimeri*, Kirby.—Abundant from May onwards.
1702. *Necrophorus vespilloides*, Hbst.—Occasional.
1706. *Silpha lapponica*, Hbst.
1715. *Necrophilus hydrophiloides*, Mann.—Abundant, especially during winter. Active under carrion even during snow.
1716. *Pelates latus*, Mann.—Abundant under logs and loose bark. Seen *in cop.* February 16th.
1719. *Agyrtes longulus*, Lec.—January 3. In flood refuse. Several taken.
1720. *Sphærites glabratus*, Fab.—Common during summer, under carrion.
1722. *Pinodytes cryptophagoides*, Mann. From June to September, under logs.
1724. *Catoptrichus Frankenhäuseri*, Mann.—Somewhat rare. Under carrion in autumn.
1725. *Choleva egena*, Horn.—Two skimmed from surface of flood refuse in meadow, 14th Oct., 1893.
1725. *Cnoleva luridipennis*, Mann. (also one specimen of a black variety). Abundant during autumn, under carrion.
1741. *Ptomaphagus pusio*, Lec.—Rare in hen's nest, 6th November, '91.
Hydnobius, probably n. sp.—In rotten grass, 17th June, 1892.
1769. *Anisotoma humeralis*, Horn.—January 3. In flood refuse. A few taken.
1803. *Agathidium concinnum*, Mann.—Under bark in December. Not common.
1804. *Agathidium rotundulum*, Mann.—Rare. Under carrion. January 3. In flood refuse. Abundant.
1807. *Agathidium pulchrum*, Lec.—Rare. Taken from mud gallery made by ants on trunk of dead alder.
1847. *Scydmaenus biformis*, Makl.—Not common. In moss at tree roots in February.
1899. *Batrissus frontalis*, Horn.—Not common. In ants' nests.
1911. *Bryaxis albionica*, Mots.—Occasionally in winter, in moss at tree roots.
1955. *Faronus parviceps*, Makl. — One specimen taken on wing in September.
2025. *Homalota granularis*, Mann.—Common in sea-weed.

2026. *Homalota maritima*, Mann.—Common. Frequents stones near low-water mark on beach.
2027. *Homalota picipennis*, Mann.—Numerous in June, under excrement.
2033. *Homalota geniculata* Makl.—Common on beach in loose dry sand near high-water mark. Under driftwood. Shaken from rotten sea-weed, June 3. Emerged and took flight on sand being pressed, April and May.
2036. *Homalota comparabilis*, Makl.—One taken in April, under driftwood on sandy beach.
2039. *Homalota fucicola*, Makl.—June 3; in rotten sea-weed.
- 2040½. *Homalota atricornis*, Fol.—Not common. Under excrement in August.
- Homalota fungi*, Grav.—Common under excrement during summer; rotten grass in June; occasionally in turf in winter.
- Homalota ingrata*, Fvl.—Numerous under carrion in May. Jet black. Legs dusky yellow.
- Aleochara californica*, Fvl.
2056. *Aleochara castaneipennis*, Mann., var. with rufous elytra.—Common under carrion, all summer.
2057. *Aleochara sulcicollis*, Mann.—Numerous under rotten sea-weed.
2058. *Aleochara cognata*, Makl.
- Aleochara littoralis*, Makl.—Under driftwood on beach.
- 2064½. *Oxypoda crassicornis*, Fvl.—January 4. Common in flood refuse.
9292. *Autalia elegans*, Casey.—Numerous in August.
- Bryobiotos Keeni*, Fvl., n. sp.—Occasional in June, under stones on sandy beach, between tide marks. Larvæ in same place.
- Phytosus Fletcheri*, Fvl.—Rare; taken in May under driftwood.
2071. *Bolitochara notata*, Makl.—(= *Californica*, Casey).—Occasional; under bark. One in June, 1893, in rotten grass. Three on carrion in March.
2075. *Leptusa*.—Occasionally under bark. March to October.
- Heterothops asperatus*, Fvl., n. sp.—Several taken in April, under driftwood on sandy beach.
9479. *Quedius erythrogaster*, Mann.—Rare; in manure heaps in May and June.
2101. *Quedius sublimbatus*, Makl.—Occasional; in moss in winter.
- Quedius marginalis*, Makl.—Occurs occasionally in summer in rotten grass.

2103. *Quedius capucinus*, Grav.—Common during summer.
2105. *Quedius lævigatus*, Gyll.
2119. *Creophilus villosus*, Grav.—Common.
2120. *Hadrotus crassus*, Mann.—Abundant in rotten sea weed.
2149. *Philonthus æneus*, Rossi.—Common under carrion in summer.
2150. " *furvus*, Nord.
2214. " *Siegwaldi*, Mann.
2221. " *nigritulus*, Grav.
2221. " *picipennis*, Makl.
2258. *Cafius canescens*, Mann.—Common under rotten sea-weed ; under log on sandy beach, April 28.
2259. *Cafius seminitens*, Horn.—Common.
2261. *Cafius luteipennis*, Horn.—Not uncommon during spring, under logs on sandy beach.
2264. *Cafius femoralis*, Makl.—Frequent in April, under driftwood or sandy beach.
2298. *Baptolinus macrocephalus*, Nord.—Common, under bark.
2311. *Stenus Juno*, Fab.—Under log, in March and June ; not numerous.
2354. *Stenus brevipennis*, Makl.—Dec. 10 ; in moss, in March.
2427. *Stenus adsector*, Makl.—Abundant in turf at all times.
- Actocharis*.—? March 3 ; under log on beach.
- Haida Keeni*, Fvl.—Not common. Found in moss at roots of trees, in December.
2565. *Liparocephalus brevipennis*, Makl.—In autumn, swarming under stones on the Massett beach.
2566. *Liparocephalus cordicollis*, Lec.
- Dialoluta insolita*, Casey.—Common in August, on barnacle-covered stones on beach.
2606. *Tachinus maculicollis*, Makl.—In fungi, in August.
2607. *Tachinus semirufus*, Horn.—Occasionally under rotten fruit, in July.
2627. *Tachinus Crotchii*, Horn.—Numerous in summer, in rotten grass.
2659. *Boletobius cingulatus*, Mann.
2664. *Boletobius 3-notatus*, Er.—On fungi, in August ; occasional.
- Mycetoporus seriaticollis*, Fvl, n. sp.—Rare. Moss. A few taken in flood refuse, in December.
2746. *Bledius albonotatus*, Makl.—Numerous in May ; burrowing in sand between tide marks.

2753. *Oxytelus fuscipennis*, Mann.—Common throughout summer, under excrement.
2763. *Haploderus linearis*, Lec.—Very numerous on under side of planks on ground, in March ; occasional in rotten grass, in October.
2785. *Ancyrophorus biimpressus*, Makl.—Common among rotten leaves in woods, in winter.
- Thinobius pygmæus*, Casey.—Numerous on pebbles between tide marks, in June.
2812. *Amphichroum testaceum*, Mann.—Numerous in May, on skunk cabbage.
2817. *Amphichroum maculatum*, Lec.—Beaten from spruce trees, in April and May.
2820. *Tanyrhinus singularis*, Mann.—March 18, on under side of log near small stream. Three only, though carefully sought for.
2821. *Trigonodemus striatus*, Lec. var. or nov. sp.—In flood refuse, 13th October, 1893.
2823. *Lathrimæum subcostatum*, Makl.—Often beaten from spruce, from May onwards ; also under carrion.
2824. *Lathrimæum fimetarium*, Makl.—Abundant under carrion during spring and autumn.
- Lathrimæum Keeni*, Fvl., n. sp.—Several in rotten sea-weed, in June.
2835. *Acrulia tumidula*, Makl.—Common throughout year, under bark ; occasionally under carrion, in November.
2838. *Homalium strigipenne*, Makl.
2841. *Homalium pusillum*, Grav.—Under chips in woods, May 30. Common. Seen *in cop.* in June. Whole body reddish, blotched with black.
- Homalium arpedinum*, Fvl., n. sp.—Common in April and May, under loose bark of felled spruce.
2843. *Homalium foraminosum*, Makl.
2847. " *humile*, Makl.
- Homalium irregulare*, Fvl.—Abundant during May, in crab and other blossoms.
9354. *Homalium algarum*, Casey.—Under logs and driftwood on sandy beach, May, November.
- Homalium concinnum*, Marsh.—Common under manure. One in wasp's nest, August 24, 1894.

- Homalium striatum*, Grav., var.—One or two under carrion, in December.
- Homalium florale*, Payk, var.—One under carrion, in March.
2863. *Anthobium pothos*, Mann.
2871. *Orobanchus simulator*, Lec.—In moss on submerged log in running stream, April 7. Two only taken.
2878. *Protinus limbatus*, Makl.—Occasional, in rotten fungi, in September.
- 2878a. " *Maklini*, Fvl.—One taken on wing, March 23.
- " *brachypterus*, Fab.
- Protinus basalis*, Makl.—Abundant during spring and autumn, under carrion. Seen *in cop.* November 13.
2882. *Megarthus pictus*, Mots.—Occurs sparingly, from April onwards. In rotten grass, in September.
2886. *Megarthus atratus*, Makl.—Not common. Under excrement, in July.
- Triognurus nebrionides*, Fvl.—Rare, under loose chips lying on dry spruce log, in August.
2906. *Micropeplus laticollis*, Makl.—Rare. Found in April, under chips.
2907. *Micropeplus punctatus*, Lec.—Several taken in June on bank of small stream. They emerged on water being thrown on the bank.
2912. *Micropeplus brunneus*, Makl.—Frequent during June and July, on newly-cut spruce logs, under half-detached chips. Seen *in cop.* in June.

(TO BE CONTINUED)

ENTOMOLOGICAL NOTES.

FROM J. ALSTON MOFFAT, LONDON, ONT.

Mr. C. G. Anderson, of this city, has a friend who is an electric-light trimmer, and began last summer taking the insects that he could conveniently secure whilst on his rounds of duty. When looking over this material recently, Mr. Anderson observed a sphinx moth that seemed strange to him; so he brought it to me to determine, when it proved to be *Dilophonota ello*, Linn., which is the first reported appearance of this Southern moth that I have heard of since the autumn of 1886, when a number of specimens of it were taken by various persons in different parts of the country.

Whilst "sugaring" on the 24th of April, Mr. Anderson found on the side of a tree a *Catogenus rufus*, Fab., as a male, paired with a *Cucujus clavipes*, Fab., as the female.

THE INSECT FAUNA OF THE SUDBURY DISTRICT, ONTARIO.

BY JOHN D. EVANS, TRENTON.

(Continued from page 146.)

LUCANIDÆ.		<i>Pachyta monticola</i> , Rand....	1
<i>Platycerus depressus</i> , Lec....	23	" <i>liturata</i> , Kirby.....	1
SCARABÆIDÆ.		" <i>rugipennis</i> , Newm...	1
<i>Aphodius fossor</i> , Linn....	7	<i>Acmæops proteus</i> , Kirby.....	83
" <i>hamatus</i> , Say....	2	" <i>pratensis</i> , Laich...	54
" <i>fimetarius</i> , Linn....	37	<i>Gaurotes cyanipennis</i> , Say....	16
* " <i>crassulus</i> , Horn....	1	<i>Bellamira scalaris</i> , Say.....	5
" <i>granarius</i> , Linn....	9	<i>Typocerus velutinus</i> , Oliv....	2
" <i>vittatus</i> , Say.....	11	<i>Leptura subhamata</i> , Rand....	5
" <i>inquinatus</i> , Hbst....	1	" <i>sexmaculata</i> , Linn....	22
" <i>leopardus</i> , Horn....	2	" <i>nigrella</i> , Say.....	16
<i>Dichelonycha elongata</i> , Fab..	88	" <i>canadensis</i> , Fab....	41
" <i>subvittata</i> , Lec.	163	" <i>erythroptera</i> , Kirby..	14
<i>Serica vespertina</i> , Gyll.....	10	" <i>sanguinea</i> , Lec.....	5
<i>Diptotaxis tristis</i> , Kirby....	2	" <i>chrysocoma</i> , Kirby..	256
<i>Lachnosterna fusca</i> , Fröh....	10	" <i>proxima</i> , Say.....	14
* " <i>insperata</i> , Smith	5	" <i>biforis</i> , Newm.....	3
<i>Euphoria fulgida</i> , Fab.....	1	* " <i>pedalis</i> , Lec.....	1
<i>Osmoderma scabra</i> , Beauv....	1	" <i>vittata</i> , Germ.....	1
<i>Trichius affinis</i> , Gory.....	73	" <i>sphæricollis</i> , Say....	3
CERAMBYCIDÆ.		" <i>mutabilis</i> , Newm..	16
<i>Asemum moestum</i> , Hald....	60	* " <i>viridipennis</i> , Hald...	3
<i>Criocephalus agrestis</i> , Kirby..	16	<i>Monohammus scutellatus</i> , Say.	77
<i>Tetropium cinnamopterum</i> ,		" <i>confusor</i> , Kirby	47
Kirby.....	4	<i>Hyperplatys maculatus</i> , Hald.	1
<i>Phymatodes dimidiatus</i> , Kirby.	18	<i>Acanthocinus obsoletus</i> , Oliv.	2
<i>Merium proteus</i> , Kirby.....	1	<i>Pogonocherus penicellatus</i> ,	
<i>Calloides nobilis</i> , Say.....	1	Lec.....	3
<i>Xylotrechus sagittatus</i> , Germ.	15	<i>Saperda moesta</i> , Lec.....	1
" <i>colonus</i> , Fab....	1	<i>Oberea ruficollis</i> , Fab.....	1
" <i>undulatus</i> , Say..	62	CHRYSOMELIDÆ.	
" <i>lunulatus</i> , Kirby.	6	<i>Donacia palmata</i> , Oliv.....	10
* " <i>interruptus</i> , Lap.	4	" <i>piscatrix</i> , Lac.....	1
<i>Clytanthus ruricola</i> , Oliv....	6	" <i>proxima</i> , Kirby....	10
<i>Rhagium lineatum</i> , Oliv.....	14	" <i>subtilis</i> , Kunze....	1

<i>Donacia æqualis</i> , Say.....	8	<i>Crepidodera Helxines</i> , Linn ..	56
* " <i>confusa</i> , Lec.....	3	<i>Systema hudsonias</i> , Forst.....	19
<i>Orsodachna atra</i> , Ahr.....	54	<i>Phyllotreta vittata</i> , Fab.....	8
<i>Syneta ferruginea</i> , Germ.....	15	<i>Psylliodes punctulata</i> , Melsh..	4
<i>Cryptocephalus 4-maculatus</i> , Say.....	16	<i>Odontota nervosa</i> , Panz.....	2
* <i>Cryptocephalus venustus</i> , Fab.	5	TENEBRIONIDÆ.	
<i>Pachybrachys femoratus</i> , Oliv.	2	<i>Phellopsis obcordata</i> , Kirby..	5
" <i>infaustus</i> , Hald.	2	<i>Iphthimus opacus</i> , Lec....	9
<i>Diachus auratus</i> , Fab....	4	<i>Upis ceramboides</i> , Linn.....	83
* " <i>pallidicornis</i> , Suffr...	7	<i>Haplandrus concolor</i> , Lec. ...	25
<i>Xanthonia 10-notata</i> , Say....	4	<i>Tenebrio tenebrioides</i> , Beauv..	5
<i>Adoxus vitis</i> , Linn.....	34	<i>Blapstinus interruptus</i> , Say...	1
<i>Chrysochus auratus</i> , Fab.....	2	<i>Tribolium madens</i> , Charp....	1
<i>Paria canella</i> , Fab.....	3	<i>Platydemia americanum</i> , Lap.	41
" <i>4-notata</i> , Say.....	4	<i>Hypophæus parallelus</i> , Melsh.	59
<i>Prasocuris obliquata</i> , Lec....	1	<i>Boletophagus corticola</i> , Say...	1
<i>Doryphora 10-lineata</i> , Say....	5	CISTELIDÆ.	
<i>Chrysomela elegans</i> , Oliv....	5	<i>Hymenorus niger</i> , Melsh. ...	2
" <i>Philadelphica</i> , Linn	11	* " <i>communis</i> , Lec. ...	1
" <i>spirææ</i> , Say.....	3	<i>Isomira quadristriata</i> , Coup..	14
" <i>Bigsbyana</i> , Kirby.	14	LAGRIIDÆ.	
<i>Gastroidea polygona</i> , Linn....	21	<i>Arthromacra ænea</i> , Say.....	126
<i>Lina lapponica</i> , Linn.....	121	MELANDRYIDÆ.	
* " <i>scripta</i> , Fab.....	2	<i>Penthe obliquata</i> , Fab.....	1
<i>Gonioctena pallida</i> , Linn....	22	<i>Melandrya striata</i> , Say.....	
<i>Phyllodecta vulgatissima</i> , Linn.	1	<i>Emmesa connectens</i> , Newm..	1
<i>Phyllobrotica discoidea</i> , Fab..	16	<i>Phryganophilus collaris</i> , Lec..	12
<i>Diabrotica 12-punctata</i> , Oliv..	1	<i>Xylita lævigata</i> , Hellw.....	18
<i>Adimonia rufo-sanguinea</i> , Say.	1	<i>Scotochroa atra</i> , Lec.....	4
<i>Galeruca sagittaria</i> , Gyll....	3	<i>Serropalpus barbatus</i> , Schall..	3
" <i>decora</i> , Say.....	118	<i>Eustrophus confinis</i> , Lec.....	1
<i>Ædionychis quercata</i> , Fab....	2	* " <i>repandus</i> , Horn..	1
<i>Disonycha alternata</i> , Ill.....	5	<i>Stenotrachelus arctatus</i> , Say..	2
<i>Haltica bimarginata</i> , Say....	127	PYTHIDÆ.	
" <i>chalybea</i> , Ill.....	1	<i>Crymodes discicollis</i> , Lec....	167
" <i>carinata</i> , Germ.....	6	<i>Boros unicolor</i> , Say.....	21
" <i>inærata</i> , Lec.....	1	<i>Pytho americanus</i> , Kirby....	73
		<i>Priognathus monilicornis</i> , Rand.....	10

OEDEMERIDÆ.		<i>Hylobius confusus</i> , Kirby....	104
<i>Calopus angustus</i> , Lec.....	4	<i>Hypomolyx pineti</i> , Fab.....	2
<i>Ditylus cæruleus</i> , Rand.....	5	<i>Dorytomus mucidus</i> , Say.....	23
MORDELLIDÆ.		" <i>brevicollis</i> , Lec....	2
<i>Anaspis nigra</i> , Hald.....	5	" <i>longulus</i> , Lec....	3.
" <i>flavipennis</i> , Hald....	7	<i>Procas Lecontei</i> , Bedel.....	1
<i>Mordella borealis</i> , Lec.....	1	<i>Lissorhoptrus simplex</i> , Say...	17
" <i>melæna</i> , Germ.....	1	* <i>Magdalis hispoides</i> , Lec.....	1
" <i>scutellaris</i> , Fab....	6	<i>Anthonomus scutellatus</i> , Gyll.	1
" <i>marginata</i> , Melsh... 1		" <i>signatus</i> , Say....	13
<i>Mordellistena scapularis</i> , Say. 1		" <i>helvolus</i> , Boh... 4	
ANTHICIDÆ.		* " <i>rufipennis</i> , Lec.. 7	
<i>Nematoplus collaris</i> , Lec.... 1		" <i>corvulus</i> , Lec... 3	
<i>Anthicus formicarius</i> , Laf.... 3		* " <i>cratægi</i> , Walsh..	
PYROCHROIDÆ.		<i>Orchestes niger</i> , Horn.....	15
<i>Dendroides concolor</i> , Newm.. 4		<i>Elleschus bipunctatus</i> , Linn..	47
MELOIDÆ		" <i>ephippiatus</i> , Say... 8	
* <i>Meloe impressus</i> , Kirby..... 2		<i>Cryptorhynchus bisignatus</i> ,	
" <i>americanus</i> , Leach.... 3		Say	1
<i>Macrobasis unicolor</i> , Kirby... 51		<i>Ceutorhynchus decipiens</i> , Lec.	1
* <i>Pomphopœa Sayi</i> , Lec..... 4		SCOLYTIDÆ.	
RHINOMACERIDÆ.		<i>Pityophthorus materiarius</i> ,	
<i>Rhinomacer pilosus</i> , Lec.... 3		Fitch.....	8
RHYNCHITIDÆ.		<i>Pityophthorus puberulus</i> , Lec.	1
<i>Rhynchites cyanellus</i> , Lec.... 5		<i>Xyloterus bivittatus</i> , Kirby... 21	
ATTELAÆIDÆ.		<i>Xyleborus cælatus</i> , Eich.... 11	
<i>Attelabus bipustulatus</i> , Fab... 1		<i>Dryocætes autographus</i> , Ratz. 8	
" <i>rhois</i> , Boh.. 4		<i>Tomicus calligraphus</i> , Germ.. 21	
OTIORHYNCHIDÆ.		" <i>cacographus</i> , Lec... 26	
<i>Otiorhynchus ovatus</i> , Linn... 1		" <i>pini</i> , Say..... 2	
CURCULIONIDÆ.		<i>Hylesinus opaculus</i> , Lec..... 1	
<i>Sitones flavescens</i> , Marsh.... 2		<i>Dendroctonus terebrans</i> , Oliv. 199	
<i>Trichalophus alternatus</i> , Say.. 1		" <i>simplex</i> , Lec... 14	
<i>Lepyrus colon</i> , Linn..... 7		<i>Hylurgops glabratus</i> , Zett.... 24	
" <i>geminatus</i> , Say..... 8		ANTHRIBIDÆ.	
<i>Pissodes strobi</i> , Peck..... 4		<i>Eurymycter fasciatus</i> , Oliv.... 1	
" <i>affinis</i> , Rand..... 56		<i>Cratoparis lunatus</i> , Fab..... 2	
" <i>dubius</i> , Rand..... 1			

SPRING COLLECTING IN ALBERTA.

BY F. H. WOLLEY DOD, CALGARY.

Perhaps the following short account of a few days' spring collecting here may be of interest to readers of the CANADIAN ENTOMOLOGIST.

The locality I have worked from during the two years that I have been in the country, is close to the mouth of Fish Creek, about twelve miles south of Calgary, and a mile from the right bank (south) of Bow River. I have a fellow worker about nine miles further west, near the head of Pine Creek, by name Mr. Arthur Hudson, a keen observer, and, I believe, the only entomologist besides myself who has ever collected here for a whole season, and between us we are at present almost daily increasing the list of macro-lepidoptera found around Calgary. We have already over fifty species of butterflies on the list, with three or four more doubtful species, and are confident that we shall be able to make several additions during the coming season. Of the moths, more particularly the Noctuidæ (and their name here is certainly Legion!), new comers never cease, as I think Prof. Smith can testify. When Mr. Elwes paid me a visit in July, 1893, he asked: "Treacle is not much used here, is it?" I replied that I had only been "at it" for a month, and was fairly well pleased with the result, though of course my take might have been exceptional. Were I asked the same question now, I should, without hesitation, reply: "Well, just *isn't* it, that's all, and from June to October, too!" During last July I not unfrequently counted from sixty to eighty moths on a treacle patch about eighteen inches long and three or four wide, comprising about fifteen or sixteen species. A sight such as that, however, certainly *is* exceptional. However, I have other modes of collecting to speak of now, as at this early date treacle is scarcely worth working.

The season commenced this year on March 29th, on which date Mr. Hudson netted at dusk a species of *Litholomia napæa* (hibernated). I saw *Vanessa milberti* on the following day. On 31st a few species of *Calocampa cineritia* showed up at treacle. Sallows were in flower in sheltered spots on April 22nd, and, it being a fairly warm night, I ventured forth, with the shattered remains of an old parasol into which to shake the moths. I felt fairly confident of some success, as I thought to myself that sallows in flower mean that spring moths have hatched; such at least has been my experience in the Old Country. At the first shake, down come several *Calocampa cineritia* and *Litholomia napæa*, both hibernated, I suppose, but some of them looking none the worse. I shake the next

tree, and down again come the same two species in crowds, especially *cineritia*, one of which comes down my neck, with a fat noctuid larva to keep it company. Such are the evils of shaking willows, though when the trees are from eight to twelve feet high, reaching the blossoms is out of the question. And, after all, I believe shaking pays best, except for geometræ, which take wing in preference to dropping. The few next trees yield the same species, one specimen of *Teniocampa pacifica*, and one of another form, which Prof. Smith says is also *pacifica*, but my observation of the two forms this spring has led me to believe that he is mistaken. Forcing my way through a thicket of willow bushes does not agree with the poor old parasol; it caught me many moths last spring, and I am loth to part with it, but the cover has now more holes than silk, and the framework is broken beyond repair, so it is left to be ignominiously chewed by cows. I have now to shake my moths on to mother earth, or, better still, in some instances, into water. A bath seldom seems to injure them, and when lying on the surface of water they are easily seen, and if out of reach of the hand can be fished out with a long stick. *Calocampa cineritia* appears rather to appreciate a dip, at least I should judge so from the fact that I frequently leave them lying inert on the water, after I have picked out all the more desirable "fry." *T. pacifica*, on the other hand, seldom lies still on the water, and from the way it skims along the surface until it finds some twig or terra firma, might almost be called a good swimmer. A few more trees are tried and two specimens of *T. pacifica* appear on the water. Ah! There is a fine form, just out of reach; I look around for a stick to fish him out, but before I can find one, away he skims across the pool as though he had suddenly recollected a pressing engagement on the opposite bank. He has not gone far before there comes a splash, and the rings on the water diverging from the spot where I last saw my fine form of *pacifica* tell me that he has gone to assist the internal economy of a young jack. About an hour's work sees me "through" for the night, and after 10 p.m. I have never found a second visit to willows pay. The catch consists, besides the above-mentioned species, of one *Ufeus satyricus* and one *Scopelosoma devia*, both, I suppose, hibernated, though both are fine specimens, particularly *devia*. The following night a visit to the same willows results in the same species, and in addition, two specimens of an undescribed Mamestra, *Xylina Georgii* (1) and *Tachnobia salicarum* (1). *T. pacifica* is decidedly on the increase, and what a variable species it is, too! To-night *Litholomia napæa* is

less common. April 27th sees me "at it again." The temperature is 44° and the air is still. To-night there is a decided falling off in the numbers of *C. cineritia* and *L. napæa*, and an increase in *T. pacifica*. I take also *Calocampa nupera* (1), *Mamestra* (undescribed) (1), and one each of two species entirely new to me; one of them apparently a *Tæniocampa*,—can it be an extreme form of *pacifica*?—and the other I should say allied to *Xylina*; but, alas! my conjectures as to the generic position of species often prove to be very wild indeed, so little have I studied classification. On the 28th I pay a visit to Mr. Hudson. He searches his blossoms, and nets moths flying around them, and his take has been even better than mine. In addition to most of the species I have mentioned, he has come across a species of *Cucullia* new to me, taken with the net only, and at least one fresh *Tæniocampa*. Some of my species, too, have been more common with him, such as *Scopelosoma devia* (in splendid condition), *Tachnobia salicarum*, and the supposed *Xylina*; also *Scopelosoma tristigmata* (2). However, he has not come across the above-mentioned *Mamestra*, n. sp., nor one or two of the others which fell to my lot. On 27th he took *Plusia californica* and *Erebia discoidalis*, perhaps a record date for the latter species, and a week earlier than I observed it last year. On April 30th I saw *E. discoidalis* (1) and *Argynnis freya* (1), and a species of *Pieris*, near the forks of Fish Creek, about twenty miles west of here. I have certainly a record for *Chionobas alberta*, Elwes., which I saw this year on May 3rd. Work at shallows this week is not very prolific, and in fact *T. pacifica* is nearly over. Treacle on May 3rd produced *C. cineritia* (common), and *Mamestra*, n. sp. (5), nothing more. On the 5th I again visit Mr. Hudson. A cold breeze is blowing from north-west, but on my way I find *Chionobas alberta* fairly common on a hillside. This species, a full description of the life-history of which will probably appear in No. XVI. of Mr. Edwards's "Butterflies of North America," appears to have a marked preference for dry, stony hillsides, where the grass is stunted in growth; just such localities, in fact, where abounds that large anemone so common in this district. But this morning the wind, and a large, slow-travelling cloud, which presently obscures the sun, prevent my taking more than a dozen specimens. In the afternoon Mr. Hudson and myself have fair sport amongst *Argynnis freya* in a deep coolie, sheltered from the wind. Here we find a sprinkling of *E. discoidalis*, but only one *C. alberta*, which prefers, despite the wind, to keep on higher ground. One specimen of a species of *Eupithæcia*, several of a small yellow "Carpet," and one of a probable species of *Boarmia*, complete the list up to date.

A NEW AEGIALE (MEGATHYMUS).

BY DR. HENRY SKINNER, PHILADELPHIA, PENNA.

Aegiale Streckeri, n. sp., ♂.—Expands from $2\frac{1}{4}$ inches to 3 inches.

Upper side.—Superiors rich brown, but not as bright, nor has the brown as much red in it, as in *yucca*. There are three sub-apical costal white spots; a lemon-yellow spot at end of cell; there is a row of five yellow spots running across the wing, parallel with the exterior margin; the upper two are small and square in shape; the lower three are small and triangular, and there is one in each of the three median interspaces. The inferiors have a yellow marginal border about $\frac{3}{8}$ inch in width, the wing being otherwise immaculate, and is clothed with long, silky brown hair. *Under side*.—Superiors have the spots repeated. Inferiors are gray, with a varying number of small white spots—one specimen having two and the other five. The female is larger and has the same number of spots as the male; the three sub-apical spots are white and the remainder yellow; in the female the five spots on the wing are in two series, the two upper being nearer the exterior margin, and the three lower are nearer the base; in other words, they do not form a continuous line as in the male. This species has been confounded, in collections, with *cofaqui*, Strecker, which was described from a female. The male of *cofaqui* is marked practically like the female, but the male has the long hair on the inferiors as in the new species. This long hair is also conspicuous in *Streckeri* at the base of the superiors below. This fine species is described from two males in my own collection; one is from Texas and the other probably from Arizona (the exact locality not being known in either case), and a pair in the collection of Dr. Herman Strecker, of Reading, Pa.; one of these is from Texas, and was collected by the late Jacob Boll, and the other from the San Juan reconnaissance, made under the charge of Lieut. Ruffner, in Colorado, in 1877. Of the four described species, *Neumoegeni* is very different from the other three; *yucca* may be known by the peculiar white spot on the anterior margin of the secondaries below. The spots on the superiors above in *Streckeri* are small, and all practically of one size, and form a straight row, while in *cofaqui* the spots are very large, being a quarter of an inch in length; the secondaries above are also spotted in this species. *Streckeri* differs in colour very much from the other species, not being nearly so red.

LOSSES CAUSED BY DESTRUCTIVE INSECTS.

In the May number of *The Century*, Vol. L, No. 1, p. 89, 1895, there is recorded an item of interest to economic entomologists that is liable to be overlooked and lost, although it deserves a better fate. In an article by Mr. William E. Smythe, on "The Conquest of Arid America," there is given a carefully-compiled table of all of the expenditures of "the Church of Jesus Christ of Latter Day Saints," in Utah, the figures being furnished, at the author's request, by Mr. A. Milton Musser, Church historian, and by him submitted to the inspection of the Presidents and Bishops of the Church, prior to publication. The figures cover a period of forty years, and the estimates are stated to be "as fair as they can be given." The one to which the attention of entomologists is here directed reads as follows:—

"Loss sustained by crickets, locusts and grasshoppers, \$2,500,000."

It is interesting to compare this amount with other items. For instance, the loss by fire during the same period was but \$800,000; building of churches and schools, \$4,000,000, or less than double the loss by insect depredations; the cost of local telegraph and railroad lines, \$3,000,000; cost of immigration and sustaining the poor, \$8,000,000; taxes, \$8,000,000.

As the estimates cover the first 40 years of the existence of the settlement, the figures are of especial value to us, as this is the period during which it is always the most difficult to obtain information.

F. M. WEBSTER, Wooster, Ohio.

NOTE AS TO CRITICISMS OF A PAPER PUBLISHED BY MR. A. G. BUTLER, ON "THE NATURAL AFFINITIES OF THE LEPIDOPTERA REFERRED TO THE GENUS *ACRONYCTA*," IN THE TRANSACTIONS OF THE NEW YORK ACADEMY OF SCIENCES.

Mr. Harrison G. Dyar says (p. 57), in his references to a paper by Mr. A. G. Butler, on "The Natural Affinities of the Lepidoptera referred to the Genus *Acronycta*," that he has "not seen any refutation of Mr. Butler's arguments, etc.," and comes to the conclusion that "Mr. Butler's position appears to have been ill-founded." If Mr. Dyar refers to *The Entomologists' Record*, Vol. I., pp. 269-271; Vol. II., p. 82; Vol. II., pp. 104-106; Vol. II., p. 150; *British Noctuae and Their Varieties*, Vol. IV., p. xxiii., he will find that Mr. Butler's paper has been very severely criticised by various entomologists, quite sufficiently, I have no doubt, to have deterred any one in touch with entomological work in Europe from "adopting his conclusions."

J. W. TUTT, Westcombe Hill, London, S. E.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XI. THE HYDROPHILIDÆ OF ONTARIO AND QUEBEC.

These water-beetles differ from Dytiscidæ especially in having the antennæ terminated by a distinct club instead of being filiform; and while, as the name implies, they are usually found in ponds or streams, they are much more feeble swimmers than the Dytiscids, and are exponents of a more generalized type. Several genera are truly terrestrial in habit, the beetles occurring about decomposing animal matter or in manure. The larvæ somewhat resemble those of the Dytiscidæ in general appearance, but differ so far as my experience goes in having toothed mandibles instead of the single suctorial ones characteristic of the other family. Pupation takes place on land in an underground cell, or in a cavity scooped out beneath a stone or piece of wood.

The generic table is based chiefly on the characters used in the LeConte and Horn "Classification," and it is hoped will prove useful. Care must be given the small specimens, and it will be found impracticable to separate them without a good lens. The genera recorded in the Canadian lists separate as follows:—

- A. Prothorax narrower than the elytra, and usually narrowed behind; form elongate, sculpture usually rough.
 - b. Elytra with ten striæ or rows of punctures, max. palpi moderate.
 - c. Last joint of max. palpi longer than preceding.
 - Antennæ 9-jointed..... *Helophorus*.
 - Antennæ 7-jointed..... *Hydrochus*.
 - cc. Last joint of max. palpi shorter than preceding.. *Ochthebius*.
 - bb. Elytra with more than ten rows of punctures, maxillary palpi very long..... *Hydræna*.
- AA. Prothorax at base as wide as the elytra, narrowed anteriorly. Form usually convex, oval or elliptical, sculpture usually weak.
 - d. Middle and hind tarsi with first joint short.
 - e. Tarsi compressed, metasternum with distinct spine.
 - f. Prosternum sulcate, metasternal spine long.
 - Large species (over 1 in. long), last joint of max. palpi shorter than the preceding..... *Hydrophilus*.
 - Smaller species (less than ½ in. long), last joint of max. palpi equal to or longer than preceding..... *Tropisternus*.
 - ff. Prosternum carinate, metasternal spine short.. *Hydrocharis*,

- ee. Tarsi not compressed, metasternum not prolonged into a spine.
 g. Last ventral segment emarginate.....*Berosus*.
 gg. Last ventral not emarginate.
 h. First and second ventrals concealed by
 plates.....*Chætarthria*.
 hh. Ventral segments uncovered.
 i. Antennæ 8-jointed, colours mostly pale, form
 rounded, convex.....*Laccobius*.
 ii. Antennæ 9-jointed, colours usually dark.
 j. Terminal joint of max. palpi shorter than pre-
 ceding.
 k. Tarsi 5-jointed on all the feet.
 Mesosternum with longitudinal
 lamina.....*Philhydrus*.
 Mesosternum with slight median
 tuberosity.....*Helochares*.
 kk. Tarsi 4-jointed on middle and hind feet.
 Mesosternum with feeble transverse carina,
 claws simple.....*Cymbiodyta*.
 Mesosternum with compressed conical pro-
 cess, claws broadly toothed at
 base.....*Helocombus*.
 jj. Terminal joint of max. palpi longer than the
 preceding.
 Elytra striate or striato-punctate....*Hydrobius*.
 Elytral punctuation confused....*Crenephilus*.
 dd. Middle and hind tarsi with the first joint elongate.
 I. Mesosternum narrow, prosternum carinate.
 Larger species; scutel elongate.....*Sphæridium*.
 Smaller species; scutel equilateral.....*Cercyon*.
 II. Mesosternum very wide, prosternum with elevated flattened
 median area.
 Prothorax margined.....*Megasternum*.
 Prothorax not margined.....*Cryptopleurum*.

HELOPHORUS, Fabr.

These insects are of a more or less elongate form and rough sculpture; they may be found in numbers by stirring up the bottom near the banks of pools, when the beetles will float to the top of the water,

where they may easily be seen and taken, since they swim very poorly, and are unable to dive rapidly. The species reported from Old Canada are eight in number, one of which (*obscurus*) may be erroneously identified, having been originally described from the Colorado River. The differential characters are:—

- A. Size larger (.23 in.), head and thorax shining, sparsely punctulate, the latter sparsely granulate at sides, median sulcus slightly undulate.....*oblongus*, Lec.
- AA. Size less (.13-.18 in.).
 - b. Elytra tuberculate (.13 in.).*tuberculatus*, Gyll.
 - bb. Elytra not tuberculate, alternate interspaces higher (.13 in.).....*inquinatus*, Mann.
 - bbb. Elytral interspaces not tuberculate nor alternating.
 - c. Hind angles of thorax obtuse.
 - d. Sides of thorax rounded in front, nearly straight behind (.18 in.).....*lacustris*, Lec.
 - dd. Sides of thorax regularly rounded.
 - Legs testaceous, median thoracic sulcus undulate (.17 in.).....*obscurus*, Lec.
 - Legs piceous, tibiæ and tarsi testaceous, median thoracic sulcus nearly straight (.12 in.)... ..*nitidulus*, Lec.
 - cc. Hind angles of thorax rectangular.
 - Thorax not narrowed at base, sides nearly straight, elytra clouded with fuscous (.12 in.).....*linearis*, Lec.
 - Thorax slightly narrowed at base, sides subsinuate, elytra with fuscous markings, of which an inverted post-median sutural V and two spots each side are most obvious (.10-.15 in.).....*lineatus*, Say.

HYDROCHUS, Leach.

Four species which are found in the same situations as *Helophorus* belong here, and, while differing considerably in facies from that genus, would at once be recognized as allied to it. The thorax is much narrower than the elytra, and the breadth only about equal to, or very slightly exceeding, the length.

- A. Smaller (.10 in.), elytral interstices not distinctly alternating, nor interrupted; thorax scarcely narrowed behind, sides straight, scarcely crenulate, basal foveæ deep.....*simplex*, Lec.
- AA. Larger (.13-.15 in.), elytral interstices alternating, and more or less interrupted.

- b. Striæ as wide or wider than the interstices.
 - Sides of thorax sinuate (.15 in.).....*squamifer*, Lec.
 - Sides of thorax crenulate (.13 in.).....*excavatus*, Lec.
- bb. Striæ narrower than the interstices (.13 in.)..*subcupreus*, Rand.

OCHTHEBIUS, Leach.

These are smaller insects than the preceding, though of much the same habits. In some parts of the Southwest they are so numerous that thousands of specimens may be taken from a small pool by stirring up the borders. They are particularly partial (in my experience) to such small ponds as have been formed by the partial drying of a small stream fed by springs. Dr. Horn has found them most abundant in shallow running water, adhering to the under side of stones. All are rather flattened, somewhat roughly sculptured little beetles, some of which look like very small *Helophori*, while others remind us by their shape of *Corticaria*. The table is extracted almost entirely from that lately published by Dr. Horn in the Trans. Am. Ento. Soc. for 1890.

- A. Thorax abruptly sinuate from middle, or deeply notched near the hind angles. Transparent border broad.
 - b. Thorax with well-marked discal foveæ.
 - Disk of thorax sparsely punctate (.06-.08 in.)..*discretus*, Lec.
 - Disk of thorax impunctate (.07 in.).....*nitidus*, Lec.
 - bb. Thorax without discal foveæ, coarsely punctate
 - (.08 in.).....*cribricollis*, Lec.
- AA. Thorax gradually sinuately narrowed from apex to base, transparent border narrow.
 - Discal impressions of thorax forming continuous line ; lateral foveæ broad and moderately deep (.06 in.).....*sculptus*, Lec.
 - Discal impressions very vague, the posterior only distinct ; the lateral foveæ in the form of indistinct sinuous impressions (.06-.08 in.).....*Holmbergi*, Mann.

HYDRÆNA, Kug.

H. pensylvanica, Kies., is found under the same conditions as *Helophorus* and *Ochthebius*. It is a small blackish insect (.075 in.), the feet, palpi and margin of thorax testaceous. Thorax sub-quadrate, densely punctured, impressed at sides, elytra sub-opaque, with rows of sub-quadrate punctures.

HYDROPHILUS, Geoff.

Includes two very large black insects, the giants of the family as represented in America. They separate thus :—

Less elongate, more convex, abdomen pubescent, the last three segments narrowly smooth at middle, without yellow spots at sides (1.25 in.). *ovatus*, G. & H.

More elongate, less convex, first abdominal segment pubescent, the remainder broadly smooth at middle, and pubescent only at sides, which are ornamented with large triangular yellow spots (1.30-1.45 in.), (fig. 13). *triangularis*, Say.

TROPISTERNUS, Sol.

The three species on the Canadian lists are very smooth, shining insects, mostly black above, and often extremely common in ponds. They are among the best swimmers of the family.

Sides of thorax and elytra yellow

(.33 in.). *nimbatus*, Say.

Entirely black above.

FIG. 13.

Surface finely and equally punctured (.40 in.). *glaber*, Hbst.

Surface unequally and more coarsely punctured (.35 in.) *mixtus*, Lec.

HYDROCHARIS, Latr.

H. obtusatus, Say, represents this genus. It is easily recognized by the size (.60 in.), and by the elytra being so obtuse behind that the posterior portion of the body is more blunt than the anterior.

BEROSUS, Leach.

Very convex, rather elongate beetles of pale colours, with darker maculations in the form of thoracic and elytral spots. Quite possibly the record of *infuscatus* may be incorrect.

Abdomen cristate in ♂, the fifth segment with one tooth at middle (.16 in.). *peregrinus*, Hbst.

Abdomen never cristate, fifth segment bidentate at middle.

Elytral striæ nearly obliterated on disk (.20-.24 in.). *infuscatus*, Lec.

Elytral striæ distinct and punctured on disk (.16-.20 in.). *striatus*, Say.

CHÆTARTHRIA, Steph.

Two very small convex species, .05 or .06 in. long, are representatives of this genus. They occur on the margins of streams and ponds, and separate easily thus:—

Black above. *nigrella*, Lec.

Thorax more or less piceous, elytra testaceous. *pallida*, Lec.



LACCOBIUS, Er.

L. agilis, Rand., is about .10 in. long, head and thorax blackish, elytra pale, clouded with dusky. Body beneath black, feet pale. It is common near the banks in small ponds.

PRELIMINARY STUDIES IN SIPHONAPTERA.—VI.

BY CARL F. BAKER, FORT COLLINS, COLO.

Genus *Hystrichopsylla*, Tschb.

1880. Taschenberg, Die Flohe, p. 83.

This genus has but a single species :—

Hystrichopsylla obtusiceps, Ritsema.

1826. Curtis, Brit. Ent., III., No. 114 (*Pulex talpæ*).

1831. Macquart, Ann. d. Sci. Nat., XXII., p. 405 (*Pulex terrestris*).

1868. Ritsema, Tijds. voor Entom., 2 ser. III., p. 173² (*Pulex obtusiceps*).

1880. Taschenberg, Die Flohe, p. 83 (*Hystrichopsylla obtusiceps*).

This remarkable flea has a heavier covering of spines and bristles than occurs in any other species. The head combs are on the discs of the cheeks with the spines pointing backward (as in *Typhlopsylla gracilis* and *fraterna*), instead of on the lower edges, there being 10 spines on either side. The first joint of the maxillary palpi is the longest. Pronotal comb with 20 spines on either side. The comb on the first abdominal segment consists of 20 spines on either side; that on the second segment, of 12 on either side, and that on the third segment, of 7 on either side. The tarsi are slender. Colour, chestnut-brown. Length of male, 3.5 mm.; of female, 5–5.5 mm. It has been reported as occurring on *Talpa europæa* and *Arvicola arvalis*, in various parts of Europe.

Genus *Typhlopsylla*, Tschb.

1880. Taschenberg, Die Flohe, p. 86.

TABLE OF SPECIES.*

- I. Head with a comb of spines.....*A.*
- II. Head without a comb of spines.....*K.*
- A. Head not unusually elongated; maxillæ triangular; head comb

* In this table I have followed Taschenberg very closely, as there are many of the species which I have never seen. The characterization of this genus in my second paper will have to be modified somewhat, as two species have come into my hands which are entirely without the head combs so general in the genus, and one in which there are five spines in each head comb.

- of 3 to 5 spines on either side ; pronotum with a comb, abdomen without any.....*G.*
- AA. Head elongated and slender ; maxillæ quadrangular ; head comb of two thick blunt spines on either side ; pronotum with a comb, abdomen usually with one or more ; in middle tarsi joint 2 as long as 3 and 4 together ; in hind tarsi joint 2 as long as 3 and 4 together, and 3 as long as 5 ; living on bats.....*B.*
- B. Abdomen without combs ; pronotal comb of 10 spines on either side ; metanotum with 2 very small teeth on either side ; tarsal joints all very narrow ; in anterior tarsi joint 1 as long as 2 and 3 together, 3 as long as 5 and somewhat more than one-half as long as 2, which is one-third shorter than 1, while 4 is one-half as long as 2 ; in hind tarsi joint 1 as long as all remaining joints together and as long as tibiæ ; length, 3 mm.....*unipectinata.*
- BB. Abdomen with one or more comb-bearing segments*C.*
- C. Abdomen with 1 to 5 comb-bearing segments*D.*
- CC. Abdomen with 7 comb-bearing segments ; first 4 with 9 spines on a side, last 3 with 5 on a side ; each segment bearing a single row of bristles ; eyes entirely absent ; antennal groove in hinder half of head ; maxillæ narrow, almost rectangular ; joint 1 of maxillary palpi longer than either of last three ; pronotal comb of 14 spines on either side ; metanotum with 12 short teeth on either side ; legs slender and thin, proximal end of first femora with 7 very small teeth ; in anterior tarsi joint 4 is the shortest, 2 is as long as 5, but much more slender, 3 about as long as 1 ; in middle tarsi joint 5 is longer than 2 ; in posterior tarsi joint 1 is one-third longer than 5, which is as long as 2 and as long as 3 and 4 together ; male claspers lamellar and rounded on upper edge ; colour, yellowish-brown ; length, 2.5-3 mm..*octactus.*
- D. Abdomen with 1 comb-bearing segment.....*F.*
- DD. Abdomen with 3 or 5 comb-bearing segments.....*E.*
- E. Abdomen with 5 comb-bearing segments ; 3 of the abdominal combs with 12 spines on either side ; pronotal comb of 12 spines on either side ; metanotum with 7 teeth on either side ; all other details same as in *octactus* ; length, 2 mm., *hexactus.*
- EE. Abdomen with 3 (the first, second and seventh) comb-bearing segments, each comb with 10 to 12 spines on a side ; those on first and second short and thick, on the seventh thin and sharp ;

- a rudimentary eye barely visible; maxillæ not so rectangular as in *octactenus*, somewhat obliquely cut off below; pronotal comb of 14 to 15 spines; metanotum with 7 teeth on either side; in anterior tarsi joint 1 as long as 5, as long as 2 and as long as 3 and 4 together, 5 is much the thickest; in posterior tarsi joint 1 as long as 2, 3 and 4 together, 2 as long as 3 and 4 together, 5 somewhat shorter; length, 2-3 mm.....*pentactenus*.
- F. Abdomen with the seventh segment, only, comb-bearing; length, 2 mm.....*dictenus*.
- G. Head comb on anterior edge of antennal groove, the spines pointing straight backward.....*J*.
- GG. Head comb in normal position on lower edge of cheeks, the spines pointing downward and backward.....*H*.
- H. Pronotal comb of 7 to 9 spines on either side; head comb of usually 3, sometimes 4, spines on either side; with a very rudimentary eye; abdominal segments with 2 dorsal rows of bristles; in middle tarsi joint 1 equals 5; in posterior tarsi joint 1 is one-third longer than 2.....*I*.
- HH. Pronotal comb of 11 spines on either side; head comb of 4 spines on either side; maxillæ short triangular; maxillary palpi with joints of nearly equal length; abdominal segments each with one ventral and two dorsal rows of bristles; legs with numerous short spines; in middle tarsi joint 2 is somewhat shorter than 1 and somewhat longer than 5; in posterior tarsi joint 1 is a half longer than 2; colour, yellowish-brown; length, 2 mm.....*musculi*.
- I. Pronotal comb of 7 spines on either side; head comb of 3, sometimes 4, spines on either side; maxillæ long and acute; male claspers in the form of two long sugar-loaf plates; colour, pitch-brown; length, 3 mm.....*caucasica*.
- II. Pronotal comb of 7 to 9 spines on either side; head comb of 3 spines on either side; male claspers boot-shaped, the sole turned up; colour, dark brown; length, 2.5 mm.....*assimilis*.
- J. Head comb of 4 spines; the two upper spines of head comb much longer than the lower; pronotal comb of 9 spines on either side; proportions of tarsal joints as in *caucasica*; male claspers blunt, of the shape of a "ninepin or a cucumber"; colour, light brown; length of male, 2-2.5 mm.; of female, 3 mm.....*gracilis*.

JJ. Head comb of 5 spines ; upper spines of head comb of same length as lowest ; pronotal comb of 14 spines on either side ; male claspers long, edges nearly parallel, slightly broadening towards tips, obliquely cut off at ends ; colour, light brown ; length of male, 2 mm. ; of female, 2.5 mm. . . . *fraterna*, n. sp.

K. Vertex strongly produced, rounded, face retreating ; head with numerous short, very strong, spine-like bristles, all pointing downward and backward ; antennæ with numerous bristles on the third joint, arising from the lower third and exceeding the joint, bristles on joint 2 very short ; mandibles exceeding the anterior trochanters ; pronotal comb of 16 spines ; leg spines weak except on the tibiæ and anterior coxæ ; on the anterior coxæ they resemble those on the head ; hind femora without a row of bristles on the side ; in middle tarsi joint 2 equals 5 ; in hind tarsi joint 1 is longer than 2, 3 and 4 together, while 5 is a half longer than 3 ; abdominal segments each with one dorsal and one ventral row of bristles, each row with 4 or 5 bristles, those in the ventral rows very strong ; claspers of male long, linear, edges parallel, rectangular at the end ; colour, reddish-brown ; length of male, 1.5 mm. ; of female, 2.5 mm. . . *alpina*, n. sp.

KK. Vertex evenly rounded from occiput to mouth, slightly flattened above in male ; head with very few weak bristles ; bristles on joint 2 of antennæ longer than third joint, which is without bristles ; mandibles attaining three-fourths of anterior coxæ ; pronotal comb of 18 to 22 spines ; leg spines strong on tibiæ and hind tarsi ; hind femora with a row of bristles on the side ; in middle tarsi joint 2 is longer than 5 ; in hind tarsi joint 1 is about as long as 2 and 3 together, while 5 is shorter than 3 ; abdominal segments each with two dorsal and two ventral rows of numerous bristles, the second dorsal row with 12 to 14 bristles, the ventral rows with nearly as many, ventral bristles not stronger than dorsal ; male claspers long, linear, edges not parallel, end somewhat obliquely cut off, rounded ; colour, brown ; length of male, 2.25 mm. ; of female, 3-3.25 mm., *americana*, n. sp.

Typhlopsylla unipectinata, Tschb.

1880. Taschenberg, Die Flohe, p. 91.

Typhlopsylla octactenus, Kol.

1856. Kolenati, Parasit. d. Chirop., p. 31 (*Ceratopsyllus octactenus*).

Typhlopsylla hexactenus, Kol.

1856. Kolenati, l. c., p. 51 (*Ceratopsyllus hexactenus*).

Typhlopsylla pentactenus, Kol.

1856. Kolenati, l. c., p. 32 (*Ceratopsyllus pentactenus*).

Typhlopsylla dictenus, Kol.

1856. Kolenati, l. c., p. 32 (*Ceratopsyllus dictenus*).

The above five species of *Typhlopsylla* are all bat fleas, and have been found on a number of kinds of bats in various parts of Europe. I regret to say that I have not been able to obtain any bat fleas from this side of the water.

Typhlopsylla musculi, Duges.

1832. Duges, Ann. d. Sci. Nat. XXVIII., p. 163 (*Pulex musculi*).

1880. Taschenberg, Die Flohe, p. 92 (*Typhlopsylla musculi*).

This species has been taken on various mice and rats in Europe. I have seen no fleas from either mice or rats taken in America.

Typhlopsylla caucasica, Tschb.

1840. Motschulsky, Bull. Soc. imp. Moscow, p. 169 (*Pulex typhlus*).

1880. Taschenberg, Die Flohe, p. 94 (*Typhlopsylla caucasica*).

"Found by Motschulsky on *Spalax typhlus* in the Caucasian Steppes."

Typhlopsylla assimilis, Tschb.

1880. Taschenberg, Die Flohe, p. 95.

Found in Europe on *Sorex vulgaris*, *Talpa europæa*, *Mus sylvaticus*, and *Arvicola arvalis*. I have specimens from Lincoln, Nebr., taken on mole (Bruner); from Ames, Iowa, taken on *Scolops argentatus* (Osborn); and I have found the same species at Lansing, Mich., on the common garden mole. In the male the head above is very slightly concave (as it is in most Pulicidæ), not convex as figured by Taschenberg, nor does the face slope conspicuously downward and backward in either male or female, but meets the cheek margin at little greater than a right angle.

Typhlopsylla gracilis, Tschb.

1880. Taschenberg, Die Flohe, p. 96.

Found in Europe on *Talpa europæa* and *Sorex vulgaris*.

Typhlopsylla fraterna, n. sp.

I have collected specimens of this very distinct species at Lansing, Mich., on the common garden mole, and have also received a specimen from Prof. J. M. Aldrich, collected at Brookings, S. D., the host not given.

Typhlopsylla alpina, n. sp.

A very unique flea, collected by Prof. Bruner at Georgetown, Colo., on Mountain Rat. The very conspicuous "bristles" of the head, and anterior coxæ, are short and spine-like, thus differing from those in any other flea I have met with. It is the most well-marked species of the genus.

Typhlopsylla americana, n. sp.

This seems to be a common species, at least west of the Mississippi. I have specimens from Ames, Iowa, taken on *Geomys bursarius* (Osborn). At Fort Collins I have found it on a large brown mole, and Prof. Gillette has taken it at the same place on the pocket gopher. Prof. Aldrich sent me a specimen taken at Moscow, Idaho, on *Thomomys talpoides*; it varies from the typical form in having but sixteen spines in the pronotal comb, but is otherwise identical.

(TO BE CONTINUED.)

DESCRIPTIONS OF THE LARVÆ OF CERTAIN
TENTHREDINIDÆ.

BY HARRISON G. DYAR, A. M., NEW YORK.

Cladius (Trichiocampus) gregarius, n. sp.

Allied to *Cladius viminalis*, Fallen. The larval habits are also identical, as seen by Dr. J. A. Lintner's account of *viminalis* in his Fourth Report, p. 44 (as *Aulacomerus lutescens*). The fly, however, is differently coloured; the larva differs but slightly, in that the lateral black spots are larger than the subdorsal ones, whereas in *viminalis* the reverse appears to be the case.

Male.—Basal joint of flagellum of antennæ with a projection on its lower side, the succeeding joints somewhat obliquely set, but simple, all densely pilose; shining black throughout, except the legs, which are pale white outwardly; coxæ, trochanters, base of femora, whole of posterior femora, and all the claws, black. The black colour fades outwardly, becoming almost sordid, luteous, not sharply separated from the white parts. Basal two-thirds of fore wing and nearly the whole of hind wing dark smoky black; the veins and stigma black. Length, 6 mm. Female.—Antennæ simple, the third and fourth joints slightly enlarged at their tips, scarcely pilose at all; coloration as in the male, or the wings rather less smoky; length, 6 mm. There are three submarginal cells, the first obscurely divided near base by an obsolete nervure; lanceolate cell contracted in the middle.

One male and four females bred on *Populus tremuloides* at Keene Valley, N.Y.

Egg.—In slits on both sides of the slender petiole of a leaf, as described by Dr. Lintner for *viminalis*.

First stage.—Head blackish; width, 3 mm. Body all pale, sordid yellowish, warts concolorous, the structure as in the mature larva.

Second stage.—As before. Width of head, .4 mm.

Third stage.—The food shows as a greenish shade. Width of head, .65 mm. The thorax is more yellowish than the abdomen.

Fourth stage.—Head shining black, rounded, mouth rather pointed, the sutures around the mouth pale; width, 1 mm. Abdominal feet present on joints 6–11 and 13, short; thoracic feet just visible from above. Simple, recurved, white hairs, four to five each from low, obscure, concolorous warts, apparently six in two rows above the spiracle on two indistinct annulets, and others more obscure, on the subventral folds. Thorax a little enlarged. Colour yellowish, not shining, the food giving a green tint by transparency, shading to ochreous on thorax and joint 12. A row of little black dots subdorsally (often absent) and a row of large lateral ones, one on each segment. Dorsal vessel dark. Anal plate concolorous with body.

Fifth stage.—Head black or yellow around the clypeus; width, 1.5 mm. Subdorsal and lateral spots large, square, black; anal plate yellow. Otherwise as before. *Cocoon* double; made entirely of soft brownish silk, of the texture of thin paper.

Cladius solitarius, n. sp.

In the absence of a male specimen, I cannot tell to which section of the genus this species is to be referred. The larval characters, however, are very different from those of the preceding species, so that it is probable we have to do with a *Cladius* proper or with *Priophorus*, most probably the latter. The fly differs from the description of *isomera*, Harr., *æqualis*, Nort., and *simplicicornis*, Nort.

Female.—Antennæ very minutely pilose, simple. Body shining black, the wings hyaline with black veins; stigma faintly tinged with luteous; the lower inner cell of hind wings does not reach as far as the cell above it, its lower outer angle somewhat pointed. Legs white; the anterior coxæ, middle and posterior coxæ except at tip, the femora

except at base and tip, black ; apex of the tibiæ and the tarsi dusky, as also the anterior trochanters, but the middle and posterior trochanters are white. Length, 6 mm.

One female, bred on *Alnus*.

* * * * *

Larva.—Third stage.—Sitting flat on the venter, solitary, eating the parenchyma of the leaf from the under side. Head round, shining black, pilose ; width, .5 mm. Abdominal feet on joints 6-11 and 13, thorax a little enlarged, abdominal feet slightly spreading. Segments distinct, rather faintly 3-annulate, annulet 1 small, 2 and 3 with many pale setæ, so that the larva is pilose or hairy. Colour translucent whitish, with no yellow tint. The food gives a dark green band by transparency, as far as joint 12. In joint 13 the fæces show black. Thoracic feet faintly yellowish tinged.

Fourth stage.—Head pale whitish, with a black shade at side and vertex ; width, .8 mm. Body whitish, with a faint greenish tinge, densely hairy, the tubercles slight. Alimentary canal gives a dark shade.

Fifth stage.—Head greenish, thickly dotted with brown ; a confluent black patch on clypeus, over eye and above and behind it ; or a patch at vertex and another on side covering the eye and reaching to back of head. Head shining, pilose ; mouth brown ; width, 1 mm. Dorsal region of body olivaceous blackish ; joint 2 anteriorly, sub-ventral region, venter, feet and joint 13 posteriorly, translucent whitish, not shiny ; body pilose, the hairs arising from thickly-placed pale tubercles on each of the three annulets. Hairs rather short and pale.

Cocoon double, made of white or brownish silk, large, and resembling thin paper.

Eriocampa fasciata, Norton.

Fly kindly determined by Mr. A. D. MacGillivray.

Fourth stage.—Exactly like the larva of *Monostegia quercus-coccinea*, Dyar, except that the head and the two posterior pairs of thoracic feet are shining black. Width of head, .55 mm.

Fifth stage.—The same ; width of head, .75 mm.

Sixth stage.—Head and thoracic feet whitish honey-yellow ; width, .75 mm. Body similar, subtranslucent, no longer shiny, finely annulated ; some dorsal watery areas. Sides of thorax bright orange ; ocelli black, mouth brown. The larvæ do not eat in this stage, but enter the ground to pupate.

Found on black oak at Plattsburgh, N. Y., and Weehawken, N. J.
In the single specimen bred, the wings are but very faintly smoky.

Blennocampa spiræa, n. sp.

Antennæ as long as head and thorax ; third joint about one and one-half times as long as fourth. First recurrent nervure received almost at base of second submarginal cell, second near base of third cell ; lanceolate cell petiolate, under wing with no middle cells. Black ; tips of femora, all of tibiæ and tarsi, sordid reddish luteous, the claws often smoky ; tegulæ black or with the outer half white ; two dots behind scutellum, white ; wings hyaline, nervures and stigma black, except close to the base, where the nervures are pale. Head and thorax very finely pubescent. Rarely the tibiæ are faintly blackish, especially the anterior pair. Length : ♂, 6 mm. ; ♀, 6.5 mm. Four males, five females.

Larva.—Eating the young leaves of *Spiræa salicifolia*, and disappearing before the middle of June ; sitting flat on the venter, solitary, but many on a bush. Keene Valley, N. Y. Head pale greenish, not shining, mouth brown, ocellus covered by a black spot ; width, 1.2 mm. Abdominal feet on joints 6–12 and 13 ; thorax a little enlarged, body very slightly flattened ventrally and tapering posteriorly. Several little white pointed elevations, like sharp teeth with two cusps ; two of them ad-dorsal on each segment, two sub-dorsal, a single 1-cusped dot laterally anteriorly, three in a triangle stigmata posteriorly and six on sub-ventral fold. Body pale bluish-green, not shining, closely like the leaf in colour.

Last stage.—Head testaceous, hardly shining, eye black ; width, 1.2 mm. Body smooth, 5 - annulate, pale yellowish - green, scarcely shining and rather opaque. On acquiring this stage, the larvæ enter the earth. The flies appeared the following April.

Monostegia rosæ, Harris.

Larva.—Head higher than wide, angularly pyriform, widest through the eyes. Pale brown, not shining, eye and mouth black ; width, 1.0 mm. Abdominal feet present on joints 6–12 and 13 (22 feet) ; thoracic feet not large, not seen from dorsal view. Body smooth, sub-translucent yellowish, broadly green dorsally from the food showing by transparency, 6-annulate, not shining, without marks. Under a lens, very slight concolorous pointed elevations represent the tubercles. These are faintly blackish towards the extremities.

Last stage.—Perfectly smooth, pale honey-yellow, almost whitish. The larvæ enter the earth on acquiring this stage without feeding.

Monostegia quercus-alba, Norton.

My specimens vary in having one or no middle cells on hind wings. The latter is, in fact, the more common, and the specimens appear to be *Caliroa obsoleta* of Norton. The larvæ, as described by me (CAN. ENT., XXVI., 43), differed from Norton's description in having the head black. I have, however, obtained larvæ like those of true *q.-alba*, and the fly is before me. It was submitted to Mr. MacGillivray, who pronounced it to be *M. q.-coccinea*, but I can scarcely agree with him, as the wings are hyaline.

Monostegia quercus-coccinea, Dyar.

Recent specimens vary in having one or two middle cells on the hind wings. Those with two middle cells seem to fit the description of *Eriocampa fasciata*, Nort., and I may be in error in having described the species as new, provided the larval characters prove illusory.

Eriocampa cerasi, Peck.

My specimens vary in having two or one middle cells on hind wings. One specimen has the lower cell present on one side, the upper present on the other with a portion of the cross-vein of the lower.

Larva common on *Cratægus sp.* and on *Amelanchier canadensis* at Woods' Holl, Mass., in July; imago in August. The larva has been often described. It has a final stage (sixth), in which the head does not grow and the larva does not eat, as in the four preceding species. Widths of head: (1) 0.25 mm. (? [not measured]), (2) 0.35 mm., (3), 0.55 mm., (4) 0.8 mm., (5) 1.1 mm., and (6) 1.1 mm.

The following synopsis will separate the larvæ of this group as far as they are known to me:—

Larva not shining, greenish (*Rosa*).....*Monostegia rosea*.

Larva shining, slimy.

Larva large, blackish (*Pyrus*, etc.).....*Eriocampa cerasi*.

Larva smaller, whitish.

Sides of thorax orange tinted (*Quercus coccinea*).

Head black.....*Eriocampa fasciata*.

Head pale.....*Monostegia q.-coccinea*.

Sides of thorax concolorous, whitish (*Quercus alba*).

Head black *.....*Caliroa obsoleta*.

Head pale †.....*Monostegia q.-alba*.

* *M. q.-alba*, CAN. ENT., XXVI., 43.

† *M. q.-alba* of Norton. Fly determined by MacGillivray differently, but I cannot corroborate him.

Harpiphorus tarsatus, Say.

Determined by Mr. MacGillivray as *H. varians*, but according to Harrington (CAN. ENT., XXV., 59) this name indicates only a variety.

Egg traces below the lower epidermis, but apparently sawed through from the upper side; elliptical patches, well separated, in straight rows parallel to a vein or transverse or irregularly distributed; many on a leaf; size, .8 x 1.2 mm.

First stage.—Head faintly brownish, eye black; width, .4 mm. Body whitish, rather opaque, annulate, not shiny, the food showing distinctly; sub-ventral fold prominent in the centre of each segment; feet on joint 6-12 and 13.

The larvæ sit all in a mass on the back of the leaf, flat on the venter, and eat the parenchyma from below.

Second stage.—The same. Width of head, .55 mm. Later the larvæ rest curled spirally and become covered with a white woolly coating.

Third stage.—Head, .65 mm. No change in colour.

Fourth stage.—Head, .8 mm.

Fifth stage.—Head, 1.1 mm.

Sixth stage.—Head, 1.5 mm.

Seventh stage.—The larvæ rest flat on the back of the leaf, curled, the anal end inside of the spiral and slightly lifted.

Head round, full at the vertex, highest centrally, clypeal sutures well-marked; smooth, black, covered with a white mealy substance nearly obscuring the surface; palpi, an area around the mouth and the distinct antennæ, pale yellowish; ocellus black; width, 1.8 mm. Thoracic feet rather small with black hooks; abdominal ones on joints 6-12, 13, large. Segments rather coarsely 6-annulate, the intersegmental incisures scarcely more distinct; sub-ventral fold well-developed, undulate. Nearly opaque honey-yellow, all the dorsal region to sub-ventral ridge covered with a mealy white secretion, partly or wholly obscuring the surface, or even growing out into filmy threads nearly 1 mm. long. Anal plate small, rounded-quadrate, black.

The white secretion is formed afresh after each moult.

[TO BE CONTINUED.]

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No. 8.

PROFESSOR WILLIAM SAUNDERS, F. R. S. C., F. L. S., ETC.

We take great pleasure in presenting this month a likeness of Prof. Saunders, who must be well-known, if not personally, certainly by reputation, to every reader of the CANADIAN ENTOMOLOGIST. He was one of the founders of the Entomological Society of Ontario in 1863, and became its President in 1875, which position he held continuously till he was appointed Director of the Experimental Farms of the Dominion in 1886. From 1874 to 1886 he was the General Editor of this Magazine, and conducted it with singular ability and success. In 1883 he published his great work: "Insects Injurious to Fruits," which has become a standard volume of reference among horticulturists and economic entomologists, and which reached a second edition in 1892. The list of his publications in the Bibliography of the Royal Society of Canada covers several pages and numbers between two and three hundred. In the words of an American writer: "by painstaking study and observation he has risen to the topmost pinnacle of fame as an entomologist, horticulturist and experimental agriculturist."

No one can be more highly esteemed by all who know him, or more beloved by his friends, than PROFESSOR WILLIAM SAUNDERS. May he long be spared in health and strength to carry on his arduous and important work for the benefit of the people of this Dominion!

OCCUPANTS OF THE GALLS OF EUROSTA SOLIDAGINIS, FITCH.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

These conspicuous spherical galls occur somewhat rarely at Ottawa upon the stems of *Solidago rugosa*, and have been found to yield only the handsome fly which produces them, and its parasite *Eurytoma gigantea*, Walsh. The 24th May last I spent at Casselman, about thirty miles southward from Ottawa, with Mr. Fletcher, and we found the galls abundant upon *Solidago serotina*, upon the banks of the South Nation. On opening one I found a pupa, apparently of a *Mordella*, in the pithy substance, and, remembering Mr. Brodie's very interesting paper (CAN.

ENT., Vol. XXIV. p. 137) upon the occupants of similar galls from Manitoba, I afterwards collected a pocketful. They were very much larger than those which are found at Ottawa, and perhaps scarcely so spherical. Many were evidently already vacated by the producing flies, but I hoped that they might still have other tenants. About a week later, as only three flies had emerged, I opened about half of them, and was rewarded by finding several inhabitants. The majority of the galls contained in the central cavity the empty puparium of the fly, but in several the larva of the fly had apparently not hatched or had soon after perished, as there was no cavity. In only one gall was found the pupa of *Eurytoma gigantea*, and in this cavity there was no puparium of the fly. In winding tunnels in the pithy substance of other galls were found a Mordellid larva and pupa, which were placed in alcohol, and a few small Chalcidid pupæ, one of which was evidently a smaller species of *Eurytoma*. Several dead larvæ of the beetles were also found in their burrows. On June 21st, as nothing had since emerged, I opened the remaining galls, and in two I found living examples of *Mordellistena nigricans*, Melsh. In each instance the central cavity of the gall contained the empty puparium of the Eurosta, which had escaped by its own exit, while the beetle was at the end of a long burrow through the solid pithy substance, and just cutting its way out. It is evident, therefore, that Mr. Brodie was mistaken in announcing this beetle as a true parasite of the fly, and as "bred from an Eurosta pupa-case." It is certainly only an inquiline, the larvæ boring in and living upon the pithy substance of the gall. Some years previously (CAN. ENT., Vol. XIII., p. 173) the late Mr. V. T. Chambers had recorded a Mordella larva, (perhaps this same species) as "common in the galls of *Gelechia gallæ-solidaginis*, Riley, in stems of Solidago, eating into and through the walls of the galls, but not disturbing the larvæ or pupæ of the moth." Besides the two beetles, there were found in the galls, in the small burrows made by the beetle larvæ, three or four more of the chalcidid pupæ and two flimsy braconid cocoons, from which emerged specimens of *Sigalphus*, answering very well to the description of *S. texanus*, Cress. The small *Eurytoma* proved apparently to be *E. studiosa*, Say, while the remaining seven pupæ developed into a species of chalcidid which I have not been able to determine. The latter species, the *E. studiosa*, and the *Sigalphus* are evidently parasites, not of the gall producing Eurosta, but of the inquiline Mordellistena. We have, therefore, from these few galls examples of the fly which produces it, a true parasite thereon, an inquiline beetle, and three parasites thereof.

NEW NORTH AMERICAN MYCETOPHILIDÆ.

BY D. W. COQUILLETT, WASHINGTON, D. C.

Platyura lurida, n. sp. ♀. Head and antennæ black, first two joints of the latter and the mouth parts somewhat yellowish. Thorax, pleura, scutellum, abdomen and legs, pale yellow, the tarsi toward the apex brownish-yellow, the thorax marked with three reddish-yellow vittæ. Wings hyaline, slightly tinged with yellowish toward the costa, otherwise unmarked; tip of auxiliary vein nearly twice the length of the humeral cross-vein beyond the base of the third; sub-costal cross-vein nearly three times the length of the humeral beyond the latter; anterior branch of the third vein oblique, ending its own length beyond the tip of the first; sixth vein reaches the wing margin. Length, 6 mm. Washington. A single specimen from Prof. O. B. Johnson.

Platyura Maudæ, n. sp. ♀. Head and antennæ black, palpi yellowish. Thorax, pleura and scutellum bluish-black. Abdomen reddish-yellow, first two segments black, the base of the second tinged with reddish; this segment is one-half longer than broad. Halteres yellowish. Coxæ reddish-yellow, blackened at their bases, femora deep yellow, tibia brownish-yellow, tarsi black. Wings yellowish-gray, a brownish spot extends from the first vein, before its apex, to the posterior branch of the fourth vein near its base; apex of wing from midway between tips of first and third veins to apex of sixth vein grayish-brown; a brown cloud on third vein near its base; tip of auxiliary vein twice the length of the humeral cross-vein beyond the base of the third; sub-costal cross-vein one and one-half times the length of the humeral cross-vein beyond the latter; anterior branch of third vein oblique, ending nearly its own length before the tip of the first; sixth vein reaches the wing margin. ♂ same as the ♀ except that the second abdominal segment is twice as long as broad, and the anterior branch of the third vein is perpendicular, ending twice its length before the tip of the first vein. Length, 9 mm. Washington. A pair from Prof. O. B. Johnson, at whose suggestion I have named this handsome species in honour of Miss Maud L. Parker, whom he designates as "one of my most faithful collectors."

Platyura pectoralis, n. sp. ♀. Front, occiput and antennæ, black; first two joints of the latter, the face, cheeks and mouth parts, yellowish. Thorax and scutellum reddish-yellow, pleura and metanotum bluish-black. Abdomen reddish-yellow, the first segment black, the second three times as long as broad. Halteres yellowish. Coxæ and femora reddish-

yellow, tibiæ brownish-yellow, tarsi black. Wings yellowish-gray; a brown spot extends from costa before tip of first vein to posterior branch of fourth vein near its base; apex of wing from midway between tips of first and third veins to apex of sixth vein, grayish-brown; a brown cloud on the third vein near its base; tip of auxiliary vein opposite base of the third; sub-costal cross-vein one and one-half times the length of the humeral beyond the latter; anterior branch of third vein oblique, ending twice its length before the tip of the first vein; sixth vein reaches the wing margin. Length, 12 mm. Nevada. A single specimen from the late Mr. Morrison.

Platyura fasciola, Coq. Described as a *Ceroptatus*, but is best located in the present genus.

Mycetophila Hopkinsii, n. sp. ♂. Black, the thorax and abdomen sub-shining, not pollinose; the halteres, femora, tibiæ and base of metatarsi dusky yellow. Antennæ twice as long as the head and thorax united, densely short, whitish pubescent. Thorax and scutellum sparse, coarse, golden-yellow pilose; abdomen fine yellowish-white pilose. Front tibiæ destitute of stout bristles except at the tip, the middle and hind ones bearing numerous black bristles. Wings gray, unmarked; auxiliary vein entire, ending in the costa slightly beyond the base of the third; fourth vein forks the length of the small cross-vein beyond the latter; fifth vein forks opposite the lower end of the oblique small cross-vein; sixth vein scarcely reaching beyond the middle of the posterior fork of the fifth; costal vein reaches the first third of distance between tips of third vein and anterior branch of the fourth. Length, 4 mm. Morgantown, W. Va. A single specimen from Prof. A. D. Hopkins, after whom the species is named.

Dynatosoma fulvida, n. sp. ♀. Yellow, the antennæ and apices of tarsi black, tibiæ tinged with brown; an indistinct brownish fascia extends from one ocellus to the other, or the entire front and occiput are sometimes black. Wings yellowish-gray; a brown spot extends from costa to base of posterior branch of fourth vein; apex of wing from before tip of first vein to apex of posterior branch of fifth vein, brownish, enclosing a sub-hyaline spot that extends from the third vein to the middle of the third posterior cell; tip of auxiliary vein three times the length of the humeral cross-vein beyond the latter, ending in the first vein; sixth vein not nearly reaching the wing margin. Middle and hind tibiæ each bearing

outwardly three rows of stout bristles, and on the inner side with a row of smaller ones. Length, 7 mm. Washington. Two specimens from Prof. O. B. Johnson.

This is the first discovery of the present genus in this country. It is closely related to *Mycetophila*, differing principally in the course of the auxiliary vein, which terminates in the first, instead of being abbreviated, or of ending in the costa.

ON THE SUBGLOBULAR SPECIES OF LECANIUM.

BY T. D. A. COCKERELL, NEW MEXICO AGRICULTURAL EXPERIMENT STATION.

The genus *Kermes* of modern authors contains about a dozen subglobular forms, found on oaks, with one exception. These insects might be taken for species of *Lecanium*, but a microscopical examination of their characters, especially in the larva, shows that they are quite distinct from that genus.

There are, however, four known subglobular species which structurally and in the larva resemble *Lecanium* and not *Kermes*; adding to these four others which I have lately received, we have altogether eight subglobular coccidæ which show true *Lecanium* characters.

Two of these live on conifers, and are placed in a genus separated from *Lecanium*, known as *Physokermes*. *P. abietis* (mod.) = *hemicryphus*, Dalm., = *racemosum*, Ratz., = *piceæ*, Schr., inhabits Europe; *P. n. sp.* (shortly to be published) lives in Colorado.

In Europe is also found *Lecanium emerici*, Planchon, on *Quercus ilex* and *Q. coccifera*. This I have never seen, but Signoret gives its characters in some detail. The dermis is tessellate, as in *Physokermes*.

From Montevideo comes a very large species, *L. verrucosum*, Signoret, and below I describe three from Brazil.

Finally, in Australia is *L. baccatum*, Maskell. None of these last five have the dermis tessellate.

Summing up, we thus have: (1) A distinct genus of two species,—one Palæarctic, one Nearctic,—confined to conifers. (2) A single Palæarctic species, on oaks. (3) Four Neotropical species; and (4) One Australian.

It seems probable that these insects represent old types, not late developments from normal *Lecanium*. But *L. emerici* and *Physokermes*

seem somewhat related to the *Eulecanium* series, which inhabits the Palæarctic and Nearctic regions, and is entirely absent (except where introduced on cultivated plants) in the Neotropical and Australian. Now that the Neotropical series is increased to four, we can see (1) that it is diversified within its own limits, doubtless actually more numerous in species than present information shows, and probably, therefore, endemic; (2) that it more resembles the Australian species than those of the Palæarctic or Nearctic regions.

Thus the indications are, that the Palæarctic-Nearctic series of subglobular forms is altogether distinct from the Neotropical-Australian series, the resemblance being much closer superficially than in structural characters. The last-mentioned series does, however, seem to hold naturally together, and its distribution may, perhaps, be used as an argument by those who favour the hypothesis of land-connection between S. America and Australia.

The three new Neotropical species were all collected by Dr. Von Ihering, the well-known naturalist, now of the Sao Paulo Museum.

Lecanium pseudosemen, sp. nov.

♀. Scale globose, max. diam., about 10 mm., a moderate-sized specimen is long. $8\frac{1}{4}$, lat. $7\frac{1}{4}$, alt. 7 mm. Scale clasping twig; leaving, when removed, four small, broad stripes of white secretion. Colour coffee-brown, or reddish-brown, sometimes irregularly marked with yellowish; surface smooth, fairly shiny. Under a lens appears minutely tuberculose and finely and closely spotted with yellowish.

Boiled in caustic soda, it stains the liquid madder-brown, the pigment precipitating on standing.

Dermis (transmitted light) not tessellated; shows large, oval gland-pores.

Claw rather short, stout, curved, sharply pointed. Digitules of claw extending beyond its tip, rather slender, but with large knobs. Tarsal digitules only moderately long, slender, with small knobs. Tarsus somewhat arched; tibia also somewhat arched, but in a contrary (forward) direction; both slender, tibia about $\frac{1}{4}$ longer than tarsus. Femur about as long as tibia, moderately stout. Trochanter with a very long hair at its end.

Antennæ 8-jointed ; 1 unusually large and long, much longer than its breadth at apex, but hardly so long as its breadth at base ; 2 about as long as 1, and about half as broad as long ; 3 distinctly longer than 2, but not much longer ; the rest are all shorter ; 4 next longest, then 5 and 8, then 6, then 7. Formula 3 (12) 4 (58) 67 ; 1 and 2 each with two hairs near apex ; 3 with a hair not far from base.

Hab., Brazil, presumably S. Paulo, on twig of plant not determined (*Von Ihering*, No. 59). ♀. Scales sent, containing embryonic larvæ.

The dermis shows numerous moss-like ramifying bodies, presumably some parasitic alga. These growths are very much like the dendritic crystals of black oxide of manganese sometimes seen on slabs of limestone rock, but they are granular and frequently pigmented dark brown.

The scales look like large seeds or berries. Although a large species, this is by no means so large as *verrucosum*, from which it differs in several characters.

Lecanium monile, sp. nov.

♀. Scale on bark, long. 4, lat. $3\frac{1}{2}$, alt. about $2\frac{1}{2}$ mm., rounded, sub-globose, moderately shiny, reddish-brown, irregularly mottled. Posterior cleft distinct.

Dermis not reticulate ; with rather few small round gland-pores, but also with, at moderate intervals, *large oval or sub-circular reticulated patches*. This last is a very peculiar feature. No legs or antennæ found in adult.

Larvæ present in the scales ; these embryonic larvæ have 6-jointed antennæ ; 3 longest, 6 nearly as long ; 1, 2, 4, 5 subequal. They also show very long and slender tarsal digitules ; digitules of claw not alike, one filiform, the other moderately stout.

Hab., Sao Paulo, Brazil, on plant not identified (*Von Ihering*, No. 52). Several of the scales show large parasite-holes ; these, especially, look like small brown beads, the hole looking like that for the string.

Pseudokermes, subg. nov.

♀. Lecaniid, but the appearance suggesting a small *Kermes* ; covered with a thin, glassy scale, much after the manner of *Inglisia* ; antennæ and legs absent in adult ; dermis not chitinous.

Lecanium (Pseudokermes) nitens, sp. nov.

♀. Scale smooth, ochreous, very shiny, sub-globose, divided

antero-posteriorly by a shallow groove; long. $2\frac{1}{2}$, alt. 2, lat. 3 mm. Glassy scale very thin, white and semi-transparent, forming sublateral low cones, concentrically but not longitudinally striate.

Dermis (after boiling) colourless, not tessellated; a marginal row of small, short spines and round gland-orifices. No vestige of legs or antennæ could be seen, although the specimens were easy to examine for such characters by reason of the transparent dermis.

Mouth parts distinct and well-developed, mentum apparently monomeric, broad, with a pair of small bristles on each side near the tip. Rostral filaments short.

Anogenital ring with several hairs. Anal plates small, their external sides meeting at about a right angle; the anterior-external side decidedly longer than the posterior-external. Immediately cephalad of the plates, and partly surrounding them, is a broad brown chitinous crescent; its breadth in the middle rather greater than the length of the plates.

Hab., on '*Myrtus (Blepharocalyx) tweedii*'; Rio Grande do Sul, Brazil (*Von Ihering*, No. 45). I presume it infests the twigs, but the specimens sent were detached and in alcohol. The glassy covering is very fragile, and in every specimen was broken; in several altogether lost.

This remarkable coccid should form the type of a new genus, but is now placed in a sub-genus of *Lecanium* as a matter of convenience and to indicate its relationships. At first sight one would take it for a highly specialized form, the end of the branch of subglobose neotropical species. But it shows curious resemblances to several genera and species, and for this reason might be thought a primitive type.

The arrangement of the anogenital structures seems rather like that of *L. baccatum*, but that is believed to have a hairless anogenital ring.

The broadened form, with median groove, and the lack of legs in the adult, strongly suggest *Physokermes*. The derm, however, is not tessellate.

The glassy covering recalls at once *Inglisia*, but it does not show the "air-cells" of that genus. The way in which the glassy covering is formed suggests *Fairmairia*.

ON THE CABBAGE-SHAPED GALL OF *CECIDOMYIA SALICIS-BRASSICOIDES*, AND ITS OCCUPANTS.

BY C. H. TYLER TOWNSEND, BROWNSVILLE, TEXAS.

On July 9, 1892, I found in the Grand Canon, Arizona, on the Hance trail, near the Colorado River, numbers of the green galls of this species on the narrow-leaved *Salix* sp. (probably *S. longifolia*). Three that were picked on this date measure 19 to 20 mm. in length, and 11 mm. in width on widest portion near base. They preserve their light green colour, except for their whitish, thick pubescence. Some last year's galls were also found in the canon on the willows near the stone cabin. They measure 16 to 17 mm. in length, and 10 to 11 mm. in width. They are more spread out apically; therefore not conical in outline, and are reddish-brown in colour, probably from being weathered.

Three galls of this species, from West Cliff, Colorado, sent me by Mr. T. D. A. Cockerell, measure only 13 to 14 mm. in length, by 8 to 9½ mm. in greatest width, near base. They are well cone-shaped, but reddish-brown in colour save for the grayish external pubescence. These are mentioned by Mr. Cockerell in *Entom.*, 1890, p. 280.

Green galls of this cecid were found near Las Cruces, August 21, 1892, in great numbers on *Salix longifolia* along the *acequia madre* in the Alameda. They were little more than one-half inch long at this date, and were borne in numerous dense clusters of a dozen or more each. On Nov. 13 and 14, 1892, over 200 of these galls were picked from the willows in the above locality. Many of the clusters were on twigs that had died, showing that the galls kill the new growth to a considerable extent. Some were found on topmost twigs of the willow 10 feet high, while others were within 3 or 4 feet of the ground and frequently in masses. One thick bunch contained 21 galls. Eight of the smaller sizes and seven of the larger, selected from these 200 galls, measure as follows:—

LENGTH. WIDTH.		LENGTH. WIDTH.	
Smaller Galls.	6 by 6 mm.	Larger Galls.	15 by 10 mm.
	7 " 5½ "		17 " 11 "
	7 " 6 "		18 " 10 "
	7 " 6½ "		18 " 11 "
	9 " 6½ "		19 " 9 "
	12 " 9 "		20 " 10 "
	13 " 8½ "		22 " 10½ "
	14 " 7 "		

The above include the smallest and largest. The smallest are not fully developed, and lack the tapering tip; while the longest depend for their length on this tip being well elongated, since it will be seen that the width of the larger ones is more nearly equal. The smaller galls, while varying in length 8 mm., vary in width $3\frac{1}{2}$ mm. But the larger ones, while varying in length 7 mm., vary in width only 2 mm.

Of these 200 galls, thirteen were opened on Nov. 13, the same day collected. Six contained the plump, perfectly white larva; while the other seven contained smaller light brown, elongate puparia enclosing a transformed hymenopterous parasite alive and ready to emerge. One of the parasites which was pulled from its puparium moved its legs and showed signs of life. The galls containing these hymenopterous puparia were the most dried ones in appearance, and were on dead branches. This parasite seems to remain transformed within its puparium in the centre of the galls all winter, issuing in the early spring. Specimens were bred and identified by Mr. Ashmead as *Platygaster obscuripennis*, Ashm. On March 16, 1893, four of the cecids were found issued and dead; while there was a number of the parasites issued, and only one or two of these dead, most of them being very active and one pair in coitu. Up to March 24, 1893, one more cecid had issued, making five cecids in all; while of the parasites ten had issued. In issuing, the cecids sometimes, if not frequently, leave their pupa-skins sticking by the abdominal portion in the tip of the cone-like gall. On April 9, 1893, 30 more cecids were found issued and dead, 2 more alive, and 2 blackish pupæ issued from galls. Not a single parasite had issued since March 24, but a live one appeared April 9.

The following are descriptions of the occupants of this gall:—Larva of *Cecidomyia salicis-brassicoides*.—Length, 2.35 to $3\frac{1}{2}$ mm.; width, 1.35 to 2 mm. Colour perfectly pure white originally, changed by immersion in alcohol to rosy or pale orange. Oblong-oval in form, plump, fleshy, apodous, consisting of 13 segments. Head rather sunken and retracted within anterior end of body, little more than one-third width of next segment; latter hardly more than one-half width of third segment, which in turn is considerably narrower than fourth, and the fourth is narrower than fifth. These segments are all about the same length so far as length is appreciable in their partially retracted condition. Segments 6 to 8 are very slightly wider than 5, nearly equal in width,

segment 7 being the widest portion of body. Segments 6 to 10 are nearly equal in length and much longer than segment 5, but segments 7 and 8 are equal and slightly the longest in the body. Segments 9 to 11 are gradually narrowed and successively slightly shortened, 12 and 13 being much more narrowed and more or less retracted within posterior end of body. Whole integument bare, with a minutely rugose-appearing surface. Anal segment with a perpendicular median wrinkle on lower half; twelfth segment bearing above on posterior margin a pair of minute short horn-like prolongations of the integument, projecting transversely inward towards each other, the tip of each pale brownish. Mouth parts appearing as a pale brownish spot in centre of capital segment, with a minute brownish dot on each side at edge of it. Breastbone pale brownish, nearly as wide as long, or narrowed on basal half or more, with a pair of 2-jointed palpus-like organs on terminal portion, the tip of each minutely darker at the suture dividing the two joints, the basal joint stout and rather elongate subconical, the terminal joint minute and very short conical.

Described from six specimens, taken from galls on November 13th.

Puparium of *Platygaster obscuripennis*, Ashm. (containing transformed adult).—Length, 2.3-5 to 2.4-5 mm.; width posteriorly, 1 to 1.1-5 mm.; width anteriorly, about 3-5 mm. Colour light yellowish-brown, appearing dark brown where the adult shows within. Subcylindrical, gradually narrowed and subtruncate anteriorly, rounded oval posteriorly. Surface of whole integument minutely punctured. Circular surface of plate of anterior subtruncate end somewhat wrinkled and roughened, with a small central lighter-coloured tubercle, and with an organ on lower edge of plate forming part of integument and bearing a striking resemblance to the breastbone of the cecid, but probably representing the mouth parts of the hymenopterous larva.

Described from four specimens taken from galls, Nov. 13.

Adult of *P. obscuripennis*.—Length, 1.4-5 to 2.2-5 mm. Wholly shining black, legs pale brownish except most of femora and sometimes part of tibiae black. Wings nearly transparent, very faintly smoky, reaching beyond abdomen, thickly and minutely short hairy.

Mr. Ashmead also identified a second parasite bred from this cecid as *Decatoma* sp.

DESCRIPTIONS OF THE LARVÆ OF CERTAIN
TENTHREDINIDÆ.

BY HARRISON G. DYAR, A. M. NEW YORK.

(Continued from page 196.)

Eighth stage.—Head shining black, yellowish punctured around the mouth, antennæ yellowish; eye and jaws black; width, 1.8 mm. Body ochreous yellow, 6-annulate with irregular quadrate sub-dorsal (two per segment) and lateral (one per segment) black spots, confluent on joint 13; sub-ventral ridge faintly discoloured; anal plate blackish. No white secretion. The larvæ do not feed in this stage, but seek for soft wood in which they bore their galleries for pupation.

Eight stages is probably the least number which these larvæ have. I have found them with the following widths of head:—2.2 mm., 2.45 mm., 2.9 mm. This indicates that they may have as many as eleven stages, perhaps in the case of large females.

Acordulecera dorsalis, Say.

Determined by Mr. MacGillivray.

Only on the very young leaves of the black oak, eating the whole leaf down irregularly. Sitting flat on the venter, but holding on by the thoracic feet, and flap up the abdominal portion when disturbed. Feet on joints 6–11, 13, but very small, nearly aborted, none of them used; thoracic feet large. Body smooth, stiff as if inflated, shining colourless, the food showing green. Segments marked into 4 annulets by creases, not incised. Sub-ventral fold prominent, in the centre of the segment, giving the outline a fluted appearance. Tracheæ very evident. Head colourless, tinged with blackish, or with brownish in the last growing stage (width, .8 mm.), especially below; a little fine pile; eye black, mouth brown.

Last stage.—The larvæ moult and enter the ground; colour faintly bluish, less transparent and with distinct blackish dots in three transverse rows per segment. Head grayish-tinted; width, .8 mm. Body smooth, a little shiny, sub-ventral folds scarcely prominent.

Hylotoma McLeayi, Leach.

I was much surprised to find that the larvæ which produced flies of this species were totally different from those described by Norton (Trans. Am. Ent. Soc., IV., 78, 1872).*

*I have seen the larvæ which he describes, but their structure and position are like those of the species of *Emphytus* which I have bred. My larvæ died.

Larvæ abundant on wild cherry (*Prunus serotina*) at Woods' Holl, Mass., often gregarious, sitting on the edge of the leaf, the body held down close to it. The abdominal feet, though small, are used.

Eggs.—Laid in a series of saw-cuts along the edge of the leaf between the upper and lower epidermis, the series often extending from the middle to apex of the leaf. Incisions nearly circular, open on the edge, slightly swollen; 1.2 mm. in diameter.

There appear to be eight larval stages, but I have not observed the early ones.

Fourth stage.—About as in the next stage, but smaller and the tubercles quite indistinct except sub-ventrally, owing to their small size and pale colour. They hardly appear more than blackish spots. Colour pale, more of a honey-yellow than the mature larva, a greenish shade from the alimentary canal. Width of head, 1.1 mm.

Fifth stage.—Head shining brownish-black without depressions; width, 1.4 mm. Tubercles greenish-black, less distinct than finally. Joints 2 and 12 appear yellow, as the green shade from the alimentary canal is interrupted there.

Sixth stage.—Width of head, 1.75 mm. There is very little change; the tubercles gradually become larger and darker coloured.

Seventh stage.—Width of head of ♂, 1.75 mm.; of ♀, 2.2 mm. Much as in the next stage.

Eighth stage.—Head full at vertex, evenly rounded, sutures obscure; smooth, shining black with four dents in front; ocellus depressed; width: ♂, 1.75 mm.; ♀, 2.2 mm. Body large, full, with sub-ventral folded ridge. Thoracic feet large and strong, abdominal ones small, present on joints 6 to 11 and 13 with a very rudimentary pair on joint 12. Segments obscurely 3-annulate. Body orange-yellow or yellow, with a diffuse greenish shade from the alimentary canal. Thoracic feet except at joints, abdominal feet outwardly, suranal plate and the rather large (0.2 mm. diameter), round, minutely setiferous tubercles, shining black. The tubercles are low, rounded, smooth, each with a central, short, black seta. They are arranged in three rows on each segment, nine on each side in a square above the sub-ventral fold, with one or two little ones just posterior to the spiracle; on sub-ventral ridge a single elongate, slightly oblique one, bearing six or more setæ; three in the anterior row ventrally, but only one in the two posterior rows. The arrangement is somewhat modi-

fied at the extremities. Spiracles black. At the end of this stage the larvæ empty their intestinal canals and spin cocoons on the surface of the ground without moulting.

Cocoon entirely of yellow silk, double, the outer layer of coarse meshes, the inner thinner and more compact. Larvæ in July; the flies emerged the following April. In the last moult there is no increase in the size of the head, but the larvæ feed in the last stage. The ♂ larvæ are smaller than the ♀, and their heads do not enlarge at the moult before the last, so they possess the anomalous character of having three stages without any growth of the head. I have never observed anything of this kind in the Lepidoptera, perhaps owing to their very different manner of moulting. In the saw-flies the old head is split at each moult, as in the Lepidoptera at pupation only, and the new one has to grow after the moulting instead of largely before it, as in the Lepidoptera.

Hylotoma pectoralis, Leach. The red-headed birch saw-fly.

A general description of this larva has been given by Rev. T. W. Fyles (CAN. ENT., XVIII., 38). I have a few details to add.

Found on the black birch (*Betula lenta*) at Woods' Holl, Mass., and Plattsburgh, N. Y.; also common on the white birch (*Betula papyrifera*) at Keene Valley, N. Y.

Eggs.—Laid in a series of saw-cuts along the edge of the leaf between the upper and lower epidermis, producing slight swellings 1.5 mm. in diameter. The eggs are soft and white.

The number of larval stages was not exactly determined, but what evidence I have leads me to believe that there are eight, and I shall describe them on that basis.

First stage.—Head reddish; width .6 mm. Body essentially as in the next stage (Keene Valley).

Second stage.—Head shining black, a little paler at sutures, round, about as high as wide, dented at clypeus; width, about .7 mm. Thoracic feet black, except at the joints. Body as in the next stage, but the piliferous dots much smaller and so less distinct (Woods' Holl).

Third stage.—Head light reddish-brown, shining, clypeus slightly indented in black; eye black in a black spot; head well rounded, rather higher than wide, full at vertex; width, .9 mm. Thoracic feet large, largely black; abdominal feet small, their bases black and corresponding spots on the apodal segments. Body shining yellowish-green, alimentary canal obscured; segments hardly annulate, but with three rows of large

black spots (three per segment), besides the oblique black mark on sub-ventral ridge and minute ventral dots anterior to the legs ; all bear short, stiff, black setæ.

* * * * *

Fifth stage.—Head clear light orange-red, shining, minutely sparsely black pilose ; eye on black spot ; width, 1.4 mm. Abdominal feet on joints 6-10 and 13, small with indications of feet also on joints 11 and 12 ; thoracic ones pale with slight black marks. Body as before ; anal plate black.

Sixth stage.—Head well rounded, full at vertex, but narrowing to a central apex ; sutures obsolete, but four dents in front indicate clypeus ; shining light red with a few black setæ ; eye black ; width, 1.8 mm. Body cylindrical, of nearly even width to joint 13, which is a little smaller ; abdominal feet, corresponding spots on the apodal segments and anal plate black ; no cervical shield : thoracic feet pale brownish. Segments not annulate, shining green, yellowish laterally ; nine large elevated rounded black spots, .2 mm. in diameter, in a square on each side above the stigmatal line on each segment, one below posteriorly to the spiracle, and several small ones on the conspicuous, obliquely divided sub-ventral ridge ; a small black patch at base of abdominal feet 7-10 and minute ventral spots. Anal feet pale orange. A series of round medio-ventral orange spots, almost between the feet on joints 7-12.

Seventh stage.—Width of head, 2.2 mm. (1.8 mm. in male ?). Much as before throughout, but the black spots are larger (.25 mm.), shining blue-black.*

* * * * *

Cocoon.—Double, open reticular, of yellow silk, the outer layer of large meshes ; spun at the surface of the ground.

Lophyrus Lecontei, Fitch.

Gregarious, eating down the needles of the pine. When disturbed, the larvæ raise the thoracic feet and eject a white fluid from their mouths.

Head light red, eye and mouth black ; width : ♂, 1.8 mm. ; ♀, 2.2 mm. Thoracic feet rather small, black except at the joints. Abdominal feet present on joints 6-12 and 13 (22 feet), all well-developed. Body rather greenish-white, nearly opaque, slightly shining ; segments not very distinctly 4-annulate, with rows of microscopic black spinules on the

* The eighth stage was not noted. It probably escaped observation, as there should be no increase in size of the head, and I neglected to isolate one larva.

first, second and fourth annulets. A series of sub-dorsal, sooty black patches, tapering posteriorly, varying in different individuals. The two rows approach each other posteriorly, and on joint 13 form a single, large, quadrate patch anterior to the pale suranal rim; spots partially broken between the annulets. A similar lateral row of sub-quadrate spots; a smaller one on sub-ventral ridge, and a small spot above base of each abdominal foot, except toward the extremities of the body. Venter immaculate.

At maturity the larvæ moult, leave the trees and form their reddish-brown cocoons at the surface of the ground. Head shining sordid white with a blackish shade all over the vertex and part way down the sides, not on the clypeus; sutures evident, eye in a black spot; mouth red; width as before. Body sordid white, 6-annulate, slightly shining; alimentary canal empty. Black spots as before, but not sooty, slightly shining and minutely white-dotted. Thoracic feet slightly blackish or wholly watery-whitish.

Found on *Pinus rigida* and *P. Banksiana* at Woods' Holl, Mass., in August. Flies emerged the following spring. This was determined by Mr. MacGillivray as *Lophyrus Lecontei* (?); but as the larva corresponds with Riley's description, I have left off the mark of doubt.

Imago.—♂. Shining black, a ventral band and tip of abdomen rufous; all the femora, tibiæ and tarsi rufous, the anterior legs palest. Veins and stigma pale brownish; hind wings smoky outwardly; antennæ 21-jointed.

♀. Reddish; sides of thorax above wings and abdomen, except at tip, black; a black shade below sub-ventrally, especially on abdomen and on anterior femora; antennæ black, 21-jointed. Cross-nervure of lanceolate cell hardly oblique.

The following synopsis will separate the larvæ of *Lophyrus* at present described in works to which I have access:—

Larva without spots; head black (*Abies*)..... *Lophyrus abietis*.

Larva with angular black spots.

Head black, no sub-ventral spots (*Pinus*
strobilus)..... *Lophyrus Abbotii*.

Head red; small sub-ventral black spots (*Pinus rigida*,
etc)..... *Lophyrus Lecontei*.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XII. THE HYDROPHILIDÆ OF ONTARIO AND QUEBEC (concluded).

This paper can scarcely be considered in any sense an original one, since it consists almost entirely of tables published in greater detail by Dr. Horn in his reviews of this portion of the Hydrophilidæ. By removing the extra-limital forms, I have been able in some cases to modify the synopses so as to make them a little easier to follow, and it is hoped that they will prove of use to many students of the Canadian fauna who may not see the more complete originals. With this prelude, which will place the credit where it properly belongs, we may proceed.

PHILHYDRUS, Sol.

With this genus commences a series of less convex and usually shining black species, which are common along the edges of ponds and creeks, rising to the surface, after the manner of the Helophori, when the water is agitated. Some of them resemble each other very closely, but may be thus distinguished :

A. Above paler, testaceous to pale piceous.

b. Prosternum distinctly carinate (.14-.18 in.)... *nebulosus*, Say.

bb. Prosternum not carinate.

c. Mesosternal lamina very feeble, the anterior edge without distinct angle (.14-.16 in.)... *ochraceus*, Mels.

cc. Mesosternal lamina prominent, with distinct angle.

Thorax piceous on the disk (.16-.22 in.)... *Hamiltoni*, Horn.

Thorax entirely testaceous (.18-.24 in.)... *diffusus*, Lec.

AA. Above black or piceous black, margin sometimes pale.

d. Transversely very convex ; larger species.

Thorax and elytra with pale border (.26-.28 in.)... *cinctus*, Say.

No pale border present (.28-.32 in.)... *consors*, Lec.

dd. Sub-depressed ; smaller species (.16-.22 in.)... *perplexus*, Lec.

HELOCHARES, Muls.

Contains *H. maculicollis*, Muls.: .16-.22 in. long ; yellowish or testaceous above, with a rather large piceous thoracic spot ; head more or less piceous. Elytra with two series of coarse punctures on each (situated on the fifth and ninth intervals), and with ten moderately deep impressed striæ.

CYMBIODYTA, Bedel.

- Form very broadly oval; serial punctures of elytra distinct at sides
 (.26-.28 in.).....*rotunda*, Say.
 Form oval, serial punctures distinct (.18-.22 in.).....*fimbriata*, Mels.
 Form oblong, serial punctures wanting (.16-.18 in.).....*lacustris*, Lec.

HELOCOMBUS, Horn.

Contains a rather large species (*H. bifidus*, Lec.), .22-.28 in. long, resembling the well-known *Hydrobius fuscipes*, L., from which it may be separated by having the last joint of the maxillary palpi shorter than the preceding.

HYDROBIUS, Leach.

This name is now applied only to the larger species thereunder included in the Check List, the small ones going into *Creniphilus*. They separate thus:

- A. Brownish, elytra tessellate with darker (.28-.30 in.)..*tessellatus*, Ziegl.
 AA. Black or piceous above.

- b. Form oblong, elytra striæ distinct (.26-.32 in.)..*fuscipes*, Linn.
 bb. Form short, very convex, elytra punctate in rows.

Hind femora opaque and pubescent near base and along upper border (.30 in.).....*globosus*, Say.

Hind femora simply closely punctate near base, not pubescent (.34 in.).....*tumidus*, Lec.

CRENIPHILUS, Mots.

Smaller than the preceding, and usually found about pools. In form they differ among themselves, but are usually elliptical in outline and very convex. In the following table the name *feminalis*, Lec., is replaced by *infuscatus*, Mots.:

- A. Form oblong, fully twice as long as wide; elytra narrowed behind, testaceous at sides (.06-.08 in.).....*suturalis*, Lec.
 AA. Form elliptical, convex, not much longer than wide.

Colour above brownish to ochraceous (.08-.10 in.).....*infuscatus*, Mots.

Colour above black or piceous, more or less bronzed.

Prosternum distinctly carinate (.06-.08 in.)..*subcupreus*, Say.

Prosternum simple (.10-.14 in.).....*digestus*, Lec.

CERCYON, Leach.

The species of this genus are mostly small; black or piceous, as a rule, and with more or less yellow on the tips of the elytra or sides of

the thorax. They are found on the sea-coasts under debris of various sorts, or inland about decaying animal and vegetable matter. A number of the names on the Canadian lists do not appear in the synopsis, having been reduced to synonymy as follows: the name *limbatus* gives way to *lateralis*, *flavipes* and *nigricollis* to *melanocephalus*, while *centromaculatus* becomes *nigriceps*. The figures of the metasternum are copied from Dr. Horn, and illustrate the characters on which the table is based.

A. Mesosternal area median only (fig. 14, a).

- b. Thorax with incomplete basal line, elytra with large piceous post-median sutural spot (.12 in.) *unipunctatus*, Linn.



Fig. 14.

bb. Thorax without basal line.

c. Form oval, less convex, head oblique.

d. Elytra with sharply limited yellowish apical space.

Apical spot extending along sides (.10-.12 in.) *pratextatus*, Say.

Apical spot not extending along sides (.08 in.) *ocellatus*, Say.

dd. Elytra indefinitely paler at apex.

Elytra rufocastaneous, tip paler (.10-.12 in.) *lateralis*, Marsh.

Elytra piceous, paler at tip, eighth interval biserially punctured (.10-.12 in.) *indistinctus*, Horn.

Elytra piceous, tip paler, eighth interval uniserially punctured (.08-.10 in.) *analisis*, Payk.

cc. Form very short and convex, head vertical.

Surface opaque (.06 in.) *lugubris*, Payk.

Surface shining (.06 in.) *navicularis*, Zimm.

AA. Metasternal area laterally extended (fig. 15, b).



Fig. 15.

e. Thorax entirely black; no basal line.

f. Elytra piceous with pale apex, varying to castaneous; surface distinctly punctulate (.10-.12 in.) *hæmorrhoidalis*, Fabr.

ff. Elytra reddish, scutellar triangle and humeral stripe piceous.

Palpi pale, epipleuræ piceous (.08-.10 in.) *melanocephalus*, Linn.

Palpi with last joint piceous, epipleuræ pale (.05-.08 in.) *pygmaeus*, Ill.

ec. Thorax pale at sides, basal line distinct. Elytra pale with transverse piceous post-median band (.05-.08 in.) *nigriceps*, Marsh.

SPHÆRIDIMUM, Fabr.

S. scarabæoides, Linn., has twice been reported from Canada, once in considerable numbers. It is a shining black insect about .25 in. long, the elytra with a reddish basal spot and a much larger terminal one. The colour varies a great deal in European specimens, but the species can easily be separated from any American Sphæridiini by its large size. The figure (fig. 16) is made from an English specimen.



Fig. 16.

MEGASTERNUM, Muls.

M. posticatum, Mann., has been (perhaps erroneously) recorded here. It is about .08 in. long, convex, blackish, subopaque, elytra paler at tip, the sides of the thorax and a humeral spot less distinctly so. Elytra finely striate, striæ punctured indistinctly at middle, plainly at sides and apex. Legs rufopiceous.

CRYPTOPLEURUM, Muls.

C. minutum, Fabr. (*vagans*, Lec.), represents the genus in Canada and may be known by the generic character given in the table in addition to its small size—.08 in.—rather deeply striate elytra, which are pale at apex and often also at sides, and the sparse pubescence, which is, however, often rubbed off in old or poorly-preserved specimens.

The principal works available for the study of the North American Hydrophilidæ are:—

- 1855. Leconte, J. L., Synopsis of the Hydrophilidæ of the United States. Proc. Acad. Nat. Sci. Phil., VII., pp. 356-375.
- 1873. Horn, Geo. H., Revision of the genera and species of the tribe Hydrobiini. Proc. Am. Phil. Soc., XIII., pp. 118-137.
- 1876. Horn, Geo. H., Synoptic tables of some genera of Coleoptera, with notes and synonymy. Tr. Am. Ent. Soc., V., pp. 246-252.
- 1878. Leconte, J. L., and Schwarz, A. E., The Coleoptera of Florida. Proc. Am. Phil. Soc., XVII., pp. 353-472 (*Cyclonotum* and *Ochthebius*).
- 1890. Horn, Geo. H., Notes on the species of Ochthebius of Boreal America. Trans. Am. Ent. Soc., XVII., pp. 17-26.
- 1890. Horn, Geo. H., Notes on some Hydrobiini of Boreal America, I. c., pp. 237-278.
- 1890. Horn, Geo. H., A revision of the Sphæridiini inhabiting Boreal America, I. c., pp. 279-314.

LIST OF COLEOPTERA COLLECTED AT MASSETT, QUEEN
CHARLOTTE ISLANDS, B. C.

BY REV. J. H. KEEN.

(Continued from page 172.)

2931. *Ptenidium pullum*, Makl.—Not rare. In grass tufts in winter.
2951. *Trichopteryx xanthocera*, Matth.—Rare. Under log in February.
2952. *Trichopteryx parallelipeda*, Matth.—Rare. In grass tufts in February.
2953. *Trichopteryx diffinis*, Matth.—Common in November in seed pods of foxglove.
- Trichopteryx* (?)—Numerous.
3058. *Coccinella 9-notata*, Hbst.—Abundant in summer. Emerge from pupal state during July.
3262. *Coxelus pacificus*, Horn.—Rare under bark.
3315. *Pediacus depressus*, Hbst.—Ground ; 7th May, 1891.
3316. *Cucujus puniceus*, Mann.—Occurs sparingly under bark. Flies in May.
3348. *Dendrophagus glaber*, Lec.—Not rare ; under loose bark of fences.
3363. *Henoticus serratus*, Gyll.—Abundant in decaying leaves and on skins.
3366. *Cryptophagus*, sp.—One only taken on dry skin.
3382. *Atomaria planulata*, Makl.—Four only, taken in rotten grass in July.
3384. *Atomaria Kamtschatica*, Mots.—In moss in February.
- Atomaria*, n. sp.—Window ; one specimen taken.
3486. *Hister foedatus*, Lec.—One only taken, under rotten crab in garden in June. [Four taken subsequently.]
- Pyromalus mancus*, Casey.—Two taken *in cop.*, March 30th, in crevice of bark of spruce stump.
3662. *Brachypterus troglodytes*, Murray.—Numerous on nettles in May and June.
3699. *Epurea ambigua*, Mann.—Abundant in April under loose bark of felled spruce.
3707. *Epurea fulvescens*, Horn.—Not numerous. Berry bushes in June.
3709. *Epurea truncatella*, Mann.—Common in July, under rotten turnips.
3727. *Omosita colon*, L.—Common during summer on bones.
3765. *Rhizophagus sculpturatus*, Mann.—Not rare, under loose bark.
3767. *Rhizophagus dimidiatus*, Mann.—Under loose bark.
3768. *Rhizophagus brunneus*, Horn.—One only in June on dry log.

3779. *Stephostethus liratus*, Lec.—Common on dry skins and leaves.
Lathridius costicollis, teste Casey.
3821. *Corticaria herbivagans*, Lec.—Rare. In moss in February; in rotten grass in April.
3848. *Peltis pippingskoeldi*, Mann.—One only in July.
3875. *Peltastica tuberculata*, Mann.—Common in larder, on bread, etc.
3880. *Amphicyrta simplicipes*, Mann.—Occasionally in moss at tree roots in winter.
3882. *Simplocaria nitida*, Mots.—Numerous in moss at tree roots all winter.
3884. *Pedilophorus acuminatus*, Mann.—Not rare. In moss during winter.
3960. *Heterocerus tristis*, Mann.—Common in summer on green patches covered by tide at high water.
3988. *Eucinetus infumatus*, Lec.—Occasionally in water-bits. Once occurred in large numbers under loose bark of decaying spruce (in January), where larvæ, pupæ and adults were all represented.
3990. *Eucinetus testaceus*, Lec. (pale specimens)—Occurred with above-mentioned *Eucinetus infumatus* colony.
4065. *Epiphanis cornutus*, Esch.—Rare. On skins in July.
4152. *Cryptohypnus musculus*, Esch.—Rare. Under driftwood.
4218. *Elater nigrinus*, Payk.—Occasionally beaten from bushes under loose bark, 17 May, 1891.
4266. *Megapenthes stigmaticus*, Lec.—Common during August.
4391. *Athous ferruginosus*, Esch.—Abundant in July and August.
4433. *Corymbites resplendens*, Esch.—Not rare. On wing during May.
4441. *Corymbites furtivus*, Lec.
4451. *Corymbites carcinus*, Germ.—Frequent in June on spruce.
4451. *Corymbites carcinus*, Germ., var. *umbricola*, Esch.—Common on wing from May onwards. Seen *in cop.*, May 19.
Corymbites spectabilis, Mann.—One only taken in July on wing.
4546. *Throscus validus*, Lec.—Common in windows in June. Never taken out of doors.
4785. *Eros simplicipes*, Mann.—Occasional. Flying during May.
4901. *Podabrus piniphilus*, Esch.—Common.
4919. *Silis pallida*, Mann.—Commonly swept from grass in June.
4956. *Telephorus divisus*, Lec.—Frequent in May and June on green patches covered by tide at high water.

5274. *Hadrobregmus gibbicollis*, Lec.—Rare. Taken on wing in July.
Platycerus Keeni, Casey.—Only one colony found, under a drift-log on sandy beach in April. A few probably immature specimens still retained a slightly reddish tinge. About a dozen were taken.
5467. *Ægialia cylindrica*, Esch.—Numerous under driftwood in May.
5471. *Ægialia crassa*, Lec.—Under log on sandy beach, April 20th.
Numerous in summer, crawling on sand hills.
5476. *Psammodytes cætatus*, Lec.—Frequent under driftwood on beach.
5523. *Aphodius ruricola*, Mels.—Common in excrement.
5644. *Hoplia Sackenii*, Lec., var.—One specimen only, found on ground.
5970. *Asemum atrum*, Esch.—Not common. Under bark and on wing in May.
5983. *Opsimus quadrilineatus*, Mann.—Found under bark in January.
Opsimus quadrilineatus (black var.).—Not uncommon; under bark of spruce fences all winter.
6232. *Rhagium lineatum*, Oliv.
6299. *Leptura oblitterata*, Hald.
6350. *Leptura Behrensii*, Lec.—Wing-cases only found. February 18;
under loose spruce bark.
6367. *Plectrura spinicauda*, Mann.—Common on spruce during summer.
Varies much in size.
7226. *Phellopsis porcata*, Lec.—Rare. Two specimens only taken; one under bark, the other in a window.
7501. *Phaleria globosa*, Lec.—Numerous in April, crawling on sand.
7584. *Ægialites debilis*, Mann.—Several taken together with the larvæ.
Marolia Holmburghii.—Common from March onwards on spruce.
7723. *Rhinosimus viridiæneus*, Rand.—Frequently beaten from spruce and other trees in April.
7728. *Ditylus quadricollis*, Lec.—Common under logs on sandy beach in June and July.
7770. *Anaspis rufa*, Say.—Common during summer on Umbelliferae.
7997. *Dendroides ephemeroides*, Mann.—Under alder bark. Not rare.
Emerges from pupal form in July.
8288. *Sciopithes obscurus*, Horn.—Invariably from trees; never on the ground. (See 8297.) Common during summer. Beaten from berry bushes.

8297. *Geoderces melanothrix*, Kirby.—Under chips on the ground in great numbers and seldom on trees. (See 8288.)
8353. *Trichalophus didymus*, Lec.—Not common. Under logs and in rotten grass.
8470. *Emphyastes fucicola*, Mann.—Occurs but seldom, but then in great numbers. Under logs half buried in sand, during spring.
8471. *Plinthus carinatus*, Boh.—Our commonest weevil. Under logs.
8473. *Pissodes costatus*, Mann.—Not common. Beaten from spruce in April.
8598. *Phycocoetes testaceus*, Lec.—Not rare. Under drift-logs on beach in spring.
8599. *Trachodes ptinoides*, Germ.—Common. Under drift-logs on beach in spring. Seen *in cop.*, June 2nd.
8600. *Trachodes 4-tuberculatus*, Mots.—Not common. Found in July. Occasionally in moss at tree roots in winter.
8601. *Trachodes horridus*, Mann.—Common, under logs.
9042. *Elassoptes marinus*, Horn.—Found in extensive colonies under drift-logs in May.
9044. *Rhyncolus brunneus*, Mann.—Not rare ; in rotten wood.
Rhyncolus, n. sp.—Rare ; under driftwood on sandy beach in May and June.
9074. *Pityophthorus nitidulus*, Mann.—Not rare.
9093. *Xyloterus bivittatus*, Kirby.—Occurs sparingly on newly-cut logs and in moss at tree roots in winter.
9116. *Dryocoetes autographus*, Ratz.—Under spruce bark.
9119. *Xylocleptes concinnus*, Mann.—Very numerous in newly-fallen timber.
9142. *Micracis hirtella*, Lec.—Not rare.
9165. *Hylesinus sericeus*, Mann.—Not uncommon in dead bark.
9181. *Dendroctonus rufipennis*, Kirby, var. *obesus* (black form).—Fairly numerous in bark of newly-cut timber.
9187. *Dolurgus pumilus*, Mann.—Common in spruce bark.
Hylurgops glabratus.—Common under spruce.
9373. *Euscaphurus saltator*, Casey.—Common on under side of logs in damp places. [3987. *Dascyllidæ*.]

PRELIMINARY STUDIES IN SIPHONAPTERA—VII.

BY CARL. F. BAKER, FORT COLLINS, COLO.

The following list embraces all described species of the order Siphonaptera. For descriptions of all species known at the present time, see the preceding papers of this series, where will also be found a partial bibliography. For the complete bibliography and synonymy of all species published up to 1880, see Taschenberg's *Die Flohe*.

Order SIPHONAPTERA, Latr.

Family *Sarcopsyllida*, Tschb.Genus *Sarcopsylla*, West.

- | | |
|--------------------------------------|---------------------------------|
| 1. <i>S. penetrans</i> , L. | 2. <i>S. gallinacea</i> , West. |
| 3. <i>S. grossiventris</i> , Weyenb. | |

Genus *Rhynchopsylla*, Haller.

- 4.
- R. pulex*
- , Haller.

Family *Vermipsyllida*, Wagner.Genus *Vermipsylla*, Schimk.

- 5.
- V. alacurt*
- , Schimk.

Family *Pulicida*, Tschb.Genus *Pulex*, Linn.

- | | |
|---------------------------------------|--------------------------------------|
| 6. <i>P. kerguelensis</i> , Tschb. | 20. <i>P. ignotus</i> , Baker. |
| 7. <i>P. tuberculaticeps</i> , Bezzi. | 21. <i>P. hirsutus</i> , Baker. |
| 8. <i>P. globiceps</i> , Tschb. | 22. <i>P. Bruneri</i> , Baker. |
| 9. <i>P. pallidus</i> , Tschb. | 23. <i>P. sciurorum</i> , Bouche. |
| 10. <i>P. simulans</i> , Baker. | 24. <i>P. melis</i> , Walk. |
| 11. <i>P. irritans</i> , L. | 25. <i>P. longispinus</i> , Baker. |
| 12. <i>P. echidnæ</i> , Denny. | 26. <i>P. montanus</i> , Baker. |
| 13. <i>P. avium</i> , Tschb. | 27. <i>P. pencilliger</i> , Grube. |
| 14. <i>P. glacialis</i> , Tschb. | 28. <i>P. metallescens</i> , Kol. |
| 15. <i>P. Wickhami</i> , Baker. | 29. <i>P. gigas</i> , Kirby. |
| 16. <i>P. Gillettei</i> , Baker. | 30. <i>P. serraticeps</i> , Gerv. |
| 17. <i>P. fasciatus</i> , Bosc. | 31. <i>P. erinacei</i> , Bouche. |
| 18. <i>P. Howardii</i> , Baker. | 32. <i>P. inæqualis</i> , Baker. |
| 19. <i>P. coloradensis</i> , Baker. | 33. <i>P. goniocephalus</i> , Tschb. |

Genus *Hystrichopsylla*, Tschb.

- 34.
- H. obtusiceps*
- , Ritsema.

Genus *Stephanocircus*, Skuse.

- 35.
- S. dasyuri*
- , Skuse.

Genus *Typhlopsylla*, Tschb.

- | | |
|-------------------------------------|----------------------------------|
| 36. <i>T. unipectinata</i> , Tschb. | 42. <i>T. caucasica</i> , Tschb. |
| 37. <i>T. octactenus</i> , Kol. | 43. <i>T. assimilis</i> , Tschb. |
| 38. <i>T. hexactenus</i> , Kol. | 44. <i>T. gracilis</i> , Tschb. |
| 39. <i>T. pentactenus</i> , Kol. | 45. <i>T. fraterna</i> , Baker. |
| 40. <i>T. dictenus</i> , Kol. | 46. <i>T. alpina</i> , Baker. |
| 41. <i>T. musculi</i> , Duges. | 47. <i>T. americana</i> , Baker. |

THE GENERIC TYPES INCLUDED IN APATELA.

BY A. R. GROTE, A.M., HILDESHEIM, GERMANY.

In 1875-6 I pointed out that the earliest name for the genus, which is commonly called "*Acronycta*" by authors, is *Apatela*, Hubn., 1806; the type and sole species cited in the Tentamen being the European *A. aceris*. My attempts to group the American species and bring them into correspondence with the European forms under subgeneric titles are unsatisfactory, as I have not been able to compare sufficiently the European species in all stages with our own. I have thought it useful to give here a list of the generic names used by me with their types. These latter must be carefully studied in any revision of the group, so that the natural limits of the divisions can be ascertained. In view of the fact that the larvæ differ quite strongly in different species, these peculiarities having probably arisen under adaptation to mode of life and environment, also from mimicry, it will be interesting to correlate the groups by characters drawn from all the stages. At the same time it will be safer to found subgeneric divisions only upon peculiarities, however slight, offered by the moths alone.

APATELA.

1806. Hubn., Tent. 1, *aceris*. Sole species and therefore type.
 1816. Ochs. 4, 62, refers *aceris* with thirteen other species to the genus *Acronycta*, and cites Hubner's *Apatela* as synonymous. Afterwards the name is credited to Stephens or Ochsenheimer, and Hubner's connection with the name is overlooked.
 1875. Grt., Bull. B. S. N. H. 2, 213, refers the N. Am. species hitherto placed under *Acronycta* to *Apatela* and designates *aceris* as the type.

ACRONICTA.

1816. Ochs. 4, 62: *leporina* with thirteen other species.
 1818. Hubn., Verz. 201: *leporina* and *bradyporina* alone, thus restricting the term.

1874. Grt., List Noct. 7, takes *leporina* as the type.

This name, altered in spelling to "*Acronycta*," is used generally by authors for the entire genus, but it should be restricted to the group indicated by me, *Papilio*, 3, 68, of which the European *leporina* is typical, and to which our American *lepusculina*, *felina* and *vulpina* appear to belong:

HYBOMA.

1818. Hubn., Verz. 200: *strigosa* and *unicornis*.

The latter is a Notodontian belonging to *Schizura*, and *strigosa* should apparently be taken as type. I have not compared the species and do not know whether it has allies in the American fauna or not.

TRIAENA.

1818. Hubn., Verz. 200: *psi*, *cuspis*, *tridens*, *tritona* and an undescribed species.

1883. Grt., *Papilio*, 3, 67: designates *psi* as type and refers here as well a number of American species. This group has been treated by some European authors as of structural value (consult Guen. Spec. Général). *Occidentalis* is a typical representative American species.

JOCHEAERA.

1818. Hubn., Verz. 201: *alni*. Sole species and therefore type.

1883. Grt., *Papilio*, 3, 111: designates *alni* as type and refers here our North American *funeralis*.

PHARETRA.

1818. Hubn., Verz. 202: *Auricoma* and *menyanthidis*.

The type may be taken as *auricoma*. By a singular error I have taken this species as the type of the subgenus *Apatela* in *Papilio*, 3, 115, repeating the mistake in CAN. ENT., XVII., 94, where I have written "*auricoma*" in the text instead of "*aceris*" on page 94, the latter species being, from the context, evidently the one intended. In the list of species (p. 96) I have again wrongly used *Apatela* for the subgenus instead of *Pharetra*. The species in our fauna there cited are assumed by me to belong to the group of *auricoma*, and this seems certainly to be in part probable.

ARCTOMYSCIS.

1818. Hubn., Verz. 202: *aceris*, *euphorbia*, *esula*, *euphrasia*, *cyparissia*, *megacephala*.

1883. Grt., Papilio 3, 113, takes *euphrasia* as type, and refers the North American *sperata* as belonging here.

The genus, as proposed by Hubner, has mixed contents, and it seems quite certain that *aceris* is not structurally identical with *euphrasia*.

Two names proposed by myself: *merolonche* with the type *spinea*, and *Eulonche* with the type *oblinita*, may be assumed, with but little doubt, as being of generic importance. There remain to be considered *Megacronicta* with the type *americana*, probably distinct structurally from either *aceris* or *leporina*; *Lepitoreuma* with the type *ovata*, and *Mastiphanes* with the type *xyliniformis*. None of these groups seem to be represented in Europe, so far as my studies of the European species allow me to judge at present. The larval forms of these subgeneric types will throw some light on the phylogeny of the group, but are perhaps chiefly interesting as illustrating the range of character shown by the independent larval stage.

BOOK NOTICES.

RAMBLES IN ALPINE VALLEYS, by J. W. Tutt, F.E.S.; 208 pages, 5 plates. London: Swan, Sonnenschien & Co. (Price, 3s. 6d.)

The editor of the "Entomologist's Record and Journal of Variation" has added another to his popular books on the beauties of Nature. This time he takes the reader abroad to the lovely scenery of Switzerland, on the Italian slopes of Mont Blanc, where he wanders for the most part out of the beaten track of the ordinary tourist. Much of the volume is filled with charming pen-pictures of the infinite variety of grandeur and beauty to be found among the lofty mountain tops, the towering crags, the densely-wooded ravines and the dashing torrents of this secluded Alpine region. The eye of the naturalist does not fail to observe the marvellous variety of animal and vegetable life that is to be found in this limited area, and the author describes many a plant and flower, and especially the gay butterflies and pretty moths with which the region abounds. Some of the most interesting passages are those that deal with the phenomena of variation caused by environment, the results of the glacial epoch in the distribution of species, the effect of altitude on plants and insects, the evolution of the genus *Colias*, the production of colours, the causes of hibernation, and other topics which arise from time to time as the author rambles through the valleys or climbs the Alpine hills. The perusal of such a book as this must help the reader to see and observe, and lead him on to think out for himself the causes and the objects of the life that everywhere surrounds him.

LIST OF NORTH AMERICAN EUPTEROTIDÆ, PTILODONTIDÆ, THYATIRIDÆ, APATELIDÆ AND AGROTIDÆ: BY A. RADCLIFFE GROTE, A. M., ABHANDLUNGEN DES NATURINSSSENSCHAFTLICHEN VEREINS ZU BREMEN., VOL. XIV., 1895.

In this list are given, besides the usual series of names and synonyms, the habitat of each species, the dates of the genera with their synonyms, and the family and generic types. "The present list aims to give the proper application of the oldest generic names and to fix the exact type." Therefore, certain changes are made from the accepted nomenclature, which we may briefly notice. Ptilodontidæ for Notodontidæ, from the Ptilodonte of Hubner, which appears to be the oldest application for this family. In the family certain generic changes are made. Chatfieldia, Grt., n. gen. to include *Phersia simplaria* and *P. basitriens*; Ptilodon, Hubn., to replace *Lophopteryx*, Steph.; Eunystalea, Grt., n. gen. to include *Nystalea indiana*. *Lochmaeus* and *Seirodonta* are recognized as valid genera.

In the Thyatiridæ, *Persiscota*, Grt., n. gen. to include *Euthyatira lorata*, *semicircularis* and *candida*. The Apatelidæ include those genera formerly known as Bombycoidæ. The definition of the family appears to rest upon larval characters, and we should expect to find in it only those species of noctuidæ which have "Bombycid" (*i. e.* Arctian) larvæ—that is, with the abdominal feet equally developed and the tubercles converted into warts. The larvæ of several of our genera are still unknown, but Mr. Grote includes *Raphia* among his Apatelidæ, though the larva has the two anterior pair of feet smaller than the other, and the setæ perfectly simple and single throughout its life-history. On the other hand some of the genera at the head of the next family should probably be placed among the Apatelidæ. This is certainly the case with *Microcoelia fragilis*, the larva of which I discovered last year. Mr. Grote uses the name *Apatela*, Hubn., instead of *Acronycta*. The name Agrotidæ is proposed for the customary Noctuidæ, as the term *Noctua* is preoccupied in Birds. The list is not complete in this family. "The subfamilies Catocalinæ and Deltoidinæ are not given." Under *Agrotis* the genitalic divisions of Prof. Smith are given subgeneric value only, a proceeding which commends itself to the present reviewer. For *Noctua*, the Hubnerian term *Amathes* is employed; for *Rhizagrotis*, Smith, *Ogygia*, Hubn. For further details the list itself may profitably be consulted.

HARRISON G. DYAR,

BEETLES OF NEW ENGLAND AND THEIR KIND; a guide to know them readily. By Edward Knobel. Boston: Bradlee Whidden, 18 Arch street. (Price, 50 cents.)

Every collector of insects naturally desires to obtain the names of the specimens that he has procured. Any work that will help him in this respect is to be welcomed, and no doubt many a beginner will be glad to know of this cheap "Guide to Beetles," whose brief descriptions and hundreds of wood cuts will enable him to identify many of the conspicuous specimens that he meets with. It is a praiseworthy attempt to popularize the collecting of insects, and will, we trust, encourage many after they have found out the names to go on and study the life-history and structure of these interesting creatures. It implies a singular want of care to find that so many of the names are incorrectly spelt, when a reference to Henshaw's List would so easily have prevented a defect of this kind.

NOTES ON BUTTERFLIES.

Years ago, when Mr. Edwards made his interesting experiments with chrysalids of *Phyciodes tharos* by exposing them to a low degree of temperature, artificially produced, the results obtained in the way of suffusion in the butterflies emerging from them led one to look for like results from similar out-of-door exposure. The climatic conditions this year in this locality were especially favourable for such results. A period of unprecedented heat, from May 13-18, was followed by a cold wave of a week's duration, accompanied by two frosts.

On the second of June I found a specimen of *P. tharos* fresh from the chrysalis and much suffused, the ground colour of the wings above being almost black, with a thin sprinkling of orange-coloured scales and two or three orange-coloured spots near the base of each, and a sub-marginal row of orange-coloured crescents on the secondaries. It is considerably darker than any figured by Mr. Edwards on Plate II. of *Phyciodes* in his "Butterflies of North America." The capture is interesting, as the specimen must have been in the chrysalis state during the cold period.

On the 30th of May I took a fresh specimen of *Feniseca Tarquinius* in Malden, and another on the 17th of June in Wollaston. Both of these localities are within three miles of Boston. So far as I know these are the first instances of its capture in Mass., east of the Connecticut River valley.

During June, I also took in Wollaston three specimens of *Amblyscirtes samoset*, an exceedingly rare insect in this vicinity.

Wollaston, Mass.

FRANK H. SPRAGUE.

Mr. James Walker reports the capture of *Thecla acadica* at Orillia, in the middle of July.

Mr. J. Alston Moffat states that *Argynnis Atlantis* has for the first time been taken at London at the end of June and during July; it has also been abundant at Sarnia and Windsor.

CORRESPONDENCE.

MELSHEIMER'S SACK BEARER.

Mr. C. G. Anderson has contributed of his own capture, a fine specimen, and the first in the Society's collection, of that interesting, and, with me, rare moth *Perophora Melsheimerii*, Harris. I have never met with it in my collecting. I have often found its cases and living larva within when beating bushes, but never succeeded in rearing them. As they pass the winter in the larval state, I could not keep them in a dormant condition until their food plant, the oak, came out in spring. It is a handsome insect, with finely-curved costal edges and hooked tips to its front wings; bearing a strong resemblance, as Harris remarks, to *Bombyx mori*; but more attractive in colour and ornamentation.

J. ALSTON MOFFAT.

ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

The Seventh Annual Meeting of the Association of Economic Entomologists will be held at Springfield, Mass., on the two days immediately preceding the general sessions of the American Association for the Advancement of Science, *i. e.*, Tuesday and Wednesday, August 27 and 28, 1895. Room 4, second floor of the High School, has been assigned for this purpose, where the meetings will be called to order at 10 A. M. and 2 P. M. on the days mentioned.

Information as to hotel and railroad rates, together with the preliminary announcement of the A. A. A. S., may be obtained by addressing W. A. Webster, local Secretary, Springfield, Mass.

PROF. J. B. SMITH,
President.

C. L. MARLATT
(Washington, D. C.),
Secretary.

Sir,—I desire, on behalf of the Entomological Society of Ontario, to acknowledge the receipt—through Mr. H. H. Lyman, of Montreal—of the specimens of *Nemeophila petrosa* and *plantaginis* from which the plate was made for illustrating Mr. Bean's paper in the April number of CAN. ENT.,—in excellent condition.

J. ALSTON MOFFAT, Curator.

DEGHUEE ALUMNI.

A dinner was given to Prof. Jos. Deghuée, of the old State Street School, Brooklyn, N. Y., on April 9th, by seventy graduates. Among these were Senator Luxow ; F. W. Hinoides, Registrar ; Rufus Zogbaum, Artist ; Cashier William Halls ; DeWitt Webb ; John H. Walsh, and other prominent officials and merchants. The School is of interest as having turned out three students of American Entomology : Ed. L. Graef, who presided on this occasion ; Fred Tepper, and A. Radcliffe Grote, whose names are known to readers of the CAN. ENT. Prof. Deghuée is a graduate of the University of Bonn, and for fifty years has been active as a teacher in Brooklyn. The following lines, by A. Radcliffe Grote, were sent by the author from Bremen, and were read during the evening by Mr. Albert Steiner :—

A moment pause ! The air is stirred
From far across the main ;
A scholar's waiting for the word,
Wants to be heard again.

Look round the board ! Of all you taught,
If few attend to-day—
If any of us came to naught,
If others made their way.

All loved you. More can not be said,
O, teacher, wise and true !
The light that you upon us shed,
In love returns to you.

Fill for the absent ones a cup,
Whose hearts are yours away ;
And fill the goblet brimming up—
A thousand healths—*Deghuée !*

Mailed August 2nd, 1895.

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NOTES ON COLLECTING BUTTERFLIES IN WESTERN COLORADO, WITH A PARTICULAR ACCOUNT OF CERTAIN PAPILIOS.

BY WM. H. EDWARDS, COALBURGH, WEST VA.

In Vol. XXV., p. 253, I gave some account of the dimorphism of *P. Bairdii*, mainly from the observations and experiments of Mr. David Bruce. From what he had seen at Glenwood Springs, Colorado, he had satisfied himself that not only *Bairdii* and *Oregonia* were one species, but that *P. Hollandii*, Edw., formed part of the same. Though the two first named differ in facies more decidedly than do *Turnus* and *Rutulus*, and *Rutulus* and either *Eurymedon* or *Daunus*. *Hollandii* looks on the upper side like *Bairdii*, but beneath, while in general like *Bairdii*, the yellow spots are larger, making the surface much gayer. But the notable difference is in the markings of the body; *Hollandii* having the yellow, black-striped body of *Oregonia* (as well as *Zolicaon* and *Machaon*), while *Bairdii* has the solid black body of *Asterias*, with similar rows of yellow dots. *Hollandii* therefore has the body of *Oregonia*, with the wings of *Bairdii*, the latter somewhat modified.

In 1892, Mr. Bruce obtained eggs by confining a *Bairdii* ♀ over the food plant, and out of two pupæ which alone survived a catastrophe at his home (Brockport, N. Y.) came a *Bairdii* imago the next spring in his hands, and a female *Oregonia* with me. Mrs. Peart had received a few of the larvæ out of that lot of eggs, and from these came one *Bairdii* and one *Oregonia*. I related these facts in the paper spoken of, and then said that two of the pupæ which Mrs. Peart had were still alive, and would give butterflies the second year, or in 1894. It turned out that one *Bairdii* ♀ did come from one of these pupæ, April 25th, 1894, but the other pupa had died.

In 1893, at the same place, Mr. Bruce sent me two eggs obtained from an *Oregonia* ♀ in confinement, from one of which resulted a *Bairdii* ♂ the same season, the other larva dying. And about two weeks later he sent me another lot of *Oregonia* eggs, from which I got four *Bairdii*: 2 ♂, 2 ♀, the same season, no pupæ hibernating.

If there was no error in getting the eggs, such as overlooking eggs that had been laid on the plant before the female was tied to it, then there could be no question of dimorphism, for the eggs that I received were mailed the day they were laid, so that there was no opportunity for any mixing up of larvæ. As Mr. Bruce is an entomologist of many years' experience, and had, as he assured me, taken the utmost care in these experiments, knowing their importance, the facts showed dimorphism, and of a remarkable sort. There was nothing like it in the North American butterfly fauna.

Mr. Bruce's visits to Glenwood Springs began in 1888, and from the first he had noticed that *Bairdii* and *Oregonia* were always associated, and in about equal numbers. But it was a long time before he discovered the food plant. Some one brought him a green, black-striped caterpillar, taken on *Artemisia dracunculoides*, which looked like an *Asterias* in its last stage. From the pupa produced came a *Bairdii* imago. Then he began to get eggs by confining the females over the *Artemisia*. It seems a strange food for one of the *Asterias* or *Machaon* groups; all the known species, except *P. Indra* (that is to say, all the species whose larvæ are known), feeding on Umbelliferae, fennel, carrots, and the like. *Artemisia* belongs to the Compositæ. It is true the larvæ of the *Papilios* I am treating of will eat carrot, parsnip and fennel in confinement, but not willingly, and both Mr. Bruce and myself, also Mrs. Peart, have found the mortality excessive when feeding on those plants. There were large fields of carrots about the Springs, and we inquired of several of the owners if they had ever noticed the green caterpillars, but found no one who had done so. The *Artemisia* grows everywhere in the valley of Grand River and its tributaries, and often covers the ground over large areas. It stands about three feet high: a loose, open-growing plant, with many long stems shooting up from the base, or branching at a small angle from the main stem, and these bear very small leaves. One can look through a large clump of it and a caterpillar of the *Papilios* could not easily escape observation. The yellow eggs, too, are in strong contrast with the peculiar gray-green of the leaves, and would easily be seen.

Mr. Bruce has never caught the two forms in copulation, though he seemed to miss it more than once by a very little. He had written me that on one occasion he saw an *Oregonia* ♀ pursued by two males same, and also by three males *Bairdii*, rolling through the air like a ball, and so low down that he made effort to catch them all with a throw of his net;

but they whirled away and passed out of sight. On another day he had seen a newly-emerged female *Bairdii*, and was near it, but a low intervening bush prevented him using the net. Just then down pounced a male *Oregonia*, and the pair rose vertically in the air, circling about each other—as butterflies do in courtship—and were soon lost to view. These and other similar observations had made Mr. Bruce believe firmly in the inter-copulation of the two species.

The relation of the facts then known in the CAN. ENT. excited some little interest and some surprise, together with more or less incredulity; and I determined to accompany Mr. Bruce on his 1894 trip to Glenwood Springs, if he would let me, and go through the necessary experiments with him. Though if I had been as well acquainted with Mr. Bruce as in his company for six or seven weeks I became, I might have saved myself the journey, for nothing can be more thorough than his method of working. Nothing escapes him, and he makes no mistakes. But I am glad that I had the pleasure of his personal acquaintance and company, and I can commend Mr. Bruce as a companion and chaperon through Colorado to any lepidopterist in search of pleasure and specimens for his collection.

We reached Glenwood Springs on twenty-ninth June, from Denver, by the Rio Grande R. R., via Pueblo and the Royal Gorge Canon of the Arkansas River, which river was followed many hours to Leadville—elevation, 11,000 feet; then descended the Eagle River (a tributary of the Grand) to the Springs. The Grand River is one of the two principal streams which form the Colorado River, the other being Green River;—the junction in Utah. The whole region is semi-desert, and nothing grows without irrigation except the native clothing of grasses and scrub, and such pines and other trees as will stand the dry climate. The sun shone clear nearly every day that I spent at the Springs; very hot after 8. a. m.; with occasional showers. But in August, which the people call the “rainy season,” there was rain pretty nearly every afternoon; and in all there were two or three days that might properly be called rainy. The elevation of the hotel is 5,700 feet—high enough to ensure cool nights all the summer; and the mountains rise quite abruptly from the river, sometimes precipitously, to the height of 2,500 or 3,000 feet more. Everywhere the bottoms are narrow, and the road above the hotel has been cut out of the slope of the hill. Wherever there is a space fit for cultivation, from half an acre to twenty or thirty,

some one is in possession, and the land is irrigated by means of the water that comes from every gulch and hollow, producing abundance of root crops and all sorts of fruit—apples, plums, peaches; (but no corn).

The morning after our arrival, Mr. Bruce showed me the river road mentioned—a narrow, single track, invariably spoken of as “the trail,” now hot, dry, and covered with dust an inch or more thick. Where the hill had originally sloped to the water’s edge, the trail had been cut through the rocks, and wherever there had been a little wider space, the base of the hill to the road was covered with small pieces of rock that had fallen from above. All along were clumps of *Artemisia dracunculoides*, and here and there were thistles in bloom. About these last *Papilios* were flying: a few *Bairdii*, *Zolicao*, *Danunus*, *Rutulus*, *Eurymedon*; not one of which I had ever seen in life before. Also on same flowers, *Pieris Occidentalis*, and some *Lycaenidæ* and *Hesperids*. *Satyrus Paulus* now and then started up from the ground, or was seen flying slowly over the broken rocks. We took half-a-dozen male *Neominois Dionysius*, Scudder, a rare species described from Arizona or Utah, very little known by anybody until Mr. Bruce found it at Glenwood Springs, in 1888. This butterfly has never been seen on a flower or at water, but rises out of the dust at one’s feet and alights at a little distance in dust again, or else on the adjacent rocks, springing up like a grasshopper, and, like that, turning its body around as soon as it strikes the dust or the rocks before settling quietly. The temperature was high, and the rocks were hot enough to roast eggs; yet these creatures were manifestly comfortable. The *Papilios* were none of them fresh—most of them worn and broken, and evidently they were the last of the early brood.

The next day, July 1st, Mr. Bruce went out alone in the opposite direction from the Hotel, and returned about noon with 3 ♀ *Dionysius*, 4 ♀ *Bairdii*, 1 ♀ *Sat. Paulus*, and 1 ♀ *Zolicao*; all which we bagged for eggs; the *Papilios* on *Artemisia*, the *Satyrids* on grass. The *Zolicao* seemed to be in just the condition to give eggs, but refused.

On the 3rd July was brought in a female *Oregonia*, and a typical ♀ *Hollandii*. Also 2 ♀ *Bairdii*, and a ♀ *Coena. Ochracea*, all which were tied up. The *Hollandii* beat herself in pieces and died without having laid an egg; and we never took another female of this form. In all we got 38 eggs of *Dionysius*, 12 of *Ochracea*, and the *Oregonia* laid 81. The *Satyrid* eggs were immediately mailed to Mrs. Peart, at Philadelphia, who had kindly undertaken to help me in rearing any larvæ. The

Paulus died without eggs; and we were never again able to take a female of this fine species. The butterflies are not uncommon, but live among bushes and scrub, where it was not possible to use the net. Dr. Skinner has somewhere set down *Paulus* as synonymous with *Sthenela*, which is very wide of the mark indeed.

July 2nd, a friend who was staying at the Hotel sent us with his buckboard and driver up the next mountain trail south and back of the Springs. We turned up a ravine through which ran a swift brook, and, sometimes walking, sometimes riding, reached a height of about 2,500 feet above Grand River, going in all perhaps five miles. From the start we saw butterflies; below and along the brook, *Satyrus Ariane*, *Charon*, and in the bushes, *Paulus*; for several hundred feet rise, either in the road or on the dry and naked slopes of the hill, *Dionysius*; and wherever there were scrub oaks, *Thecla Chrysalus*, var. *citima*, H. Edwards. Scores of these last could have been taken as they rested on the oak leaves. This, according to Mr. Bruce, is the only form of the species taken at Glenwood, but to the east, near Denver, it is not found at all, while typical *Chrysalus* abounds. At about 1,500 feet there was a wide curve in the road, and just there was a spring from which a little water trickled down the track for half-a-dozen rods. Where the road bent, a footpath came in from above. Here, about the wet road, and on the path, we had a good breathing spell, and took many butterflies: *P. occidentalis*, *P. Beckerii*; *Colias Alexandra*; *Argynnis Nevadensis*, *A. Behrensii* (heretofore reported only from Mendocino County, California, and exceedingly rare in collections); *Melitæa Palla*, *M. Augusta* (another rare Californian species); *Phyciodes Carlota* and *Camillus*; *Pyr. Cardui*; *Grapta Satyrus*; *Satyrus Ariane*, *Charon*, *Paulus*; *Chionobas Chryxus* (very large specimens and very yellow). This last species flew leisurely along, alighting on the wet ground, and if disturbed did not fly wildly; in fact, behaved much like *Satyrus Nephela*. Took or saw half-a-dozen *C. Ochracea*, most of which came flying down the path spoken of. Nothing can be prettier than this insect on the wing, as it flutters along, flying low, and it appears a great deal brighter yellow than is shown in dead specimens. We also took *Limenitis Weidemeyerii*; *Chrysophani Virginiensis*, *Behrii* and *Zeroc*. This last is a very pretty species; the yellow of the under surface much brighter than in dead examples. We took about a score of them, all males. *Zeroc* flies even in British Columbia, east of the Cascade Mountains. Of *Lycæna*, we took *Fulla*,

Clara and *Amyntula*; of Hesperians, *Eudamus Nevada*, *Nisoniades Propertius*; *Pamphila Campestris*; *Amblyscirtes Aenus*. Higher up the mountain we met with nothing new. Although so little rain had fallen, and the ground seemed dry as a desert, yet along the entire drive were beautiful and showy flowers, great clumps of purple Penstemons, white and yellow *Oenotheras*, and others, the names of which I know not.

On July 6th, Mr. Bruce brought in two great-bodied females *Bairdii*, and these gave 117 and 76 eggs respectively. All the *Papilios* now were fresh, and of the second brood of the year. Mr. Bruce also took a *Neonympha Henshawii*, the first he had ever seen in this region; also *Theclas Edwardsii* and *Titus*, and *Pholisora Catullus*.

On the 10th, a fine and typical ♂ *Hollandii* was taken, matching completely the female before spoken of; and no other such male was taken during our stay. A ♀ *Oregonia* was bagged on the 11th, and the same day a *Bairdii*, confined two days before, was found to have laid 70 eggs.

I had now two lots of eggs of *Oregonia* and four of *Bairdii*. When the females were bagged, Mr. Bruce and I were in all cases together, and both examined the plants to see if perchance a stray egg might have been previously laid on them by some other *Papilio*. And I may say here that neither of us saw more than an occasional egg on any plant of *Artemisia* in the six weeks. The plants are by thousands and the butterflies few. All the bags were back of and close to the electric power house of the Hotel, where were conveniences for shading them from the fierce heat of the sun, and where there was no danger of trespassers—two-legged or four-legged. When the bags were opened, I attended to the eggs myself, clipped them off the stems, and put each sort in a box by itself. Thenceforth all eggs and larvæ were in my room at the Hotel, and were attended to solely by myself. So there was nowhere a chance of mixing up eggs or larvæ, or of error. The bits of stem which carried the eggs were placed in glass tumblers, labelled, and when the larvæ hatched, fresh stems were given, and these were changed daily. As the larvæ grew, they were shifted to tin cans covered with cloth, and overlaid by squares of heavy glass, to prevent escape as well as to afford light. Treated in this way there was scarcely any loss.

On 15th July Mr. Bruce left me for Denver and the high peaks about Hall Valley, in order to get eggs of *Chionobas Cæna*. From

Denver he wrote me he had concluded to come back to that place after he had worked at Mt. Gibson, and go home. Thereupon I divided the six lots of *Papilio* larvæ, and sent him one brood of *Oregonia* and two of *Bairdii*; and, although he did return to Glenwood Springs, 28th July, I had no more to do with his half of the larvæ. Thenceforth we made no more efforts to get eggs, as it was not worth while to try and rear larvæ in New York or in West Virginia, by reason of the great mortality sure to be suffered in feeding with umbelliferous plants. Mr. Bruce made many excursions in the hope of taking typical *Hollandii* of both sexes, but in vain. On one occasion he brought in a single *Neophasia Menapia*, and several times *Argynnis Leto*, now fresh from chrysalis. On 30th July, several fresh males of *Argynnis Nevadensis*, evidently of a second brood, and thirty *Bairdii* and *Oregonia*. The next day I went with him to the place where the *Papilios* had been taken, along the railroad up the Roaring Fork of Grand River. There, on thistles exclusively, we took thirty-four more *Bairdii* and *Oregonia*. A field of alfalfa was in flower just over the fence, but the *Papilios* did not frequent that. There were, however, on the alfalfa many of the yellow form of *Eurytheme*; namely, form *Eriphyle*, Edw. This form was often seen within the grounds of the Hotel, and elsewhere as we rode about the region. But I never saw an example of the orange form or forms (for there are three of them), nor have I ever seen a live *Eurytheme*, orange. Mr. Bruce says that when he first collected in Colorado, in 1888, the orange was not uncommon, either in the Denver district or at Glenwood Springs. But year by year he has noticed the diminishing number of the orange, and the increase of the yellow form; and it is his opinion that cultivation of alfalfa is responsible for this change.

On our way up the Rocky Fork we passed a slaughter-house in a small hollow, which was at the foot of a lofty and precipitous cliff of red sandstone; and about, on the ground, fences, and roof, were perhaps three-score ravens and half as many magpies, not at all shy or difficult to approach. We were told the ravens made their nests on the adjacent cliffs. Now, in all my years before I never saw more than two or three ravens, and then flying half a mile high in W. Va.

Besides the species of butterflies enumerated, I find but one other noted down as seen at Glenwood, and that was *Satyrus Boopis*, of which two examples were taken. Our conclusion on the butterflies in general was that while individuals were plenty, the species were really few; and probably nothing else should be looked for in a semi-desert region.

winter, viz., 5 *Oregonia*; 14 *Bairdii*; and most of them, by their size, I consider to be females. Of the entire number of pupæ (77), forty per cent. gave butterflies in the fall of 1894, thirty-two per cent. in spring of 1895, and twenty-eight per cent. will probably go to 1896.

I spoke of Mr. Bruce going after eggs of *Chionobas Œno*. The weather at Denver was fair just at that time, but at Hall Valley (11,000 elev.), and on the peaks, as forbidding as could be; day after day during his stay at his old cabin near top of Mt. Gibson, rain, snow and fog. But he found specimens of *Œno* resting under the shelter of rocks, and took some females by hand. These he brought to Hall Valley, and being confined over grass in the house there, they laid forty-five eggs, which were sent to Mrs. Peart, and in her care they hatched and the caterpillars reached pupæ the same season. Mrs. Peart was able to get the entire set of drawings of the early stages, and they will be given in Part XVII., Butt. N. A., in due time. It is enough that these stages support the conclusions I had published, that *Œno* is a distinct species from *Semidea*. My trip to Colorado was as much to get eggs of *Œno* as to rear the *Papilio* larvæ, and the success in one case, as in the other, is owing to Mr. Bruce's efforts.

I have in this, and the paper in Vol. XXV. referred to, spoken of the two Glenwood *Papilios* as *Bairdii* and *Oregonia*, but being hybrids, neither form is often true to type. Some *Bairdii* are typical; that is, they can not be distinguished from the examples taken in Arizona, where there are no *Oregonia*, and can be no intermixture. But most depart in different degrees from the type, no two being quite alike; are gayer, with yellow markings on the upper side, and much more so beneath, running off to *Hollandii*, which seems to be the extreme of variation.

Scarcely any of the so-called *Oregonia* taken or bred at Glenwood Springs agree fully with the type found, which flies where there are no *Bairdii*, in Washington and British Columbia. They are modified in the direction of *Bairdii* in several particulars. The typical male *Oregonia*, on the upper side, has the basal area of the fore wings thickly dusted with yellow scales. The submarginal black band on both wings also much dusted yellow. Beneath, the base of cell on fore wings is always gray-yellow; the nerves and branches of both wings are lightly edged with black; the submarginal band is largely covered with yellow scales, and the blue on hind wings is azure. The abdomen on ventral side is

yellow, with a thin ventral line; another such line, subventral, on the last three or four segments; the ventral line forks as it nears the thorax, leaving a yellow space between the forks.

The female has the base of fore wing as thickly dusted, perhaps more so; the submarginal band more dusted. Beneath, like the male; the cell nearly solid yellow, there being two black bars, one about middle, the other half way between this and the arc. The ventral side of abdomen is either marked by two fine black lines, or these are wholly wanting; on the side a narrow stripe.

1. A male, so-called *Oregonia*, bred from eggs laid by a female *Bairdii*, is very black above, a thin dusting of yellow scales at base of fore wing scarcely detracting from the general blackness; and the submarginal band is free from yellow scales. On the under side the cell from arc to base is black, except for a narrow transverse bar just inside the arc, and another at two-fifths the distance from arc to base. The nervures on both wings heavily edged with black; the blue not azure, but dark (as in *Bairdii*). The lines of black on abdomen are stripes rather, and next the thorax are diffused, making a broad black area.

2. A male, so-called *Oregonia*, bred from egg laid by a female of same type. This is blacker than No. 1, the yellow dusting more scanty. On under side the cell solid black, excepting the two yellow cross-bars at and near the arc; the nerves and branches heavily edged with black; the blue dark; the black stripes of abdomen confluent next thorax.

In a female corresponding to No. 2, the ventral side of the abdomen is nearly solid black; in one corresponding to No. 1, the four stripes are heavy, but not quite confluent.

The above description answers for all the examples of so-called *Oregonia* which I have bred from either same type of female or from *Bairdii*. But I have a female nearer the true type *Oregonia* that Mr. Bruce bred from egg laid by *Bairdii*, 1892, and which came out of pupa in March, 1893; spoken of in CAN. ENT., XXV., 254. This has the base of fore wing and the submarginal band much dusted yellow; the base of cell beneath, gray-yellow, ending near middle of the cell in rays, and altogether as in typical *Oregonia*; the nerves and branches lightly edged black; the submarginal band on fore wings densely dusted, making it a yellow band rather; and the blue is azure. This is the nearest example to true *Oregonia* of all the bred hybrids which I have seen.

Besides the hybrid varieties above mentioned is another that is very close to *Zolicaon*. One such example (male), out of egg of *Bairdii*, is of small size, very black above, slight dusting of yellow at base of fore wings, none on the submarginal band. Beneath the cell as in typical *Zolicaon*; that is, solid black, except the two yellow bars at and near the arc; the nervures rather heavily edged black; the blue, dark; and *much deep orange* on hind wings in all the interspaces next the black of the submarginal band, and also orange on the marginal lunules. The ventral side of abdomen solid black, by the widening of the two ventral lines so as to be confluent throughout, and the widening of the lateral stripes; next thorax the four stripes making that part of the abdomen altogether black, as in *Zolicaon*. This example has the anal black spot of *Oregonia* and *Bairdii*; that is, a pear-shaped spot, attached to the black edge of the inner margin of wing; whereas the spot in true *Zolicaon* is round, unattached. But that sort of spot appears sometimes in both true *Oregonia* and *Bairdii*, though it is rare. Except for that anal spot it would be hard to say wherein this male differs from a *Zolicaon*. Mr. Bruce has this season had a specimen come from these Glenwood pupæ that, he says, had he taken it on the wing he should have called *Zolicaon*.

From what I have said, it must be evident that the so-called *Oregonia* of Glenwood Springs is not the real article, not true *Oregonia*. It is more black, less dusted yellow (on both sides); the cell of under fore wings black (an important character); the veins beneath all more heavily edged with black; the blue, dark instead of azure; the abdomen rather black than yellow on the ventral side. That is not *Oregonia*, but a distinct type of butterfly, which, if it had been brought in from Arizona by the Wheeler Expedition, would have been pronounced a species. It may be supposed that it originated in the mating of true *Oregonia* with true *Bairdii*, at some period in the past. Whether these two species, pure type, now mingle in that region, I can not say, because I have not seen a pure *Oregonia* which was taken there. As to *Bairdii*, it varies so much, even where no *Oregonias* fly, and where there is no suggestion of intermixture, that we cannot say what the pure form is. These butterflies, as they now appear at Glenwood Springs, may have begun their career as hybrids, fifty, or one hundred and fifty, or five hundred years ago—no one can guess when; there has been evolved a distinct form, allied to *Oregonia*. It never will do for such a form to be flying without name, and I call it *Papilio BRUCEI*, and

pass it in to the next generation of lepidopterists. The so-called *Bairdii* are also not true *Bairdii*, but at present it is impossible to fix upon their type, because no two of them have been found alike. I may yet figure these butterflies, but it would take half-a-dozen plates to do them justice.

The larvæ from eggs of the *Bairdii*, as well as those from eggs of the so-called *Oregonia*, were of the *Asterias* pattern; in the first three stages, black, or brown-black, with white saddle-patch on 7, 8, 9, and dots and small spots of white irregularly placed on dorsum or upper part of side, no two individuals being quite alike in this respect. After third moult, green, with a black band across the middle of each segment, in which are set rounded yellow or orange spots; the junctions of the segments also black. The green of *Oregonia* after fourth moult was bright yellow-green, the black bands narrow, the spots a rich chrome. Of *Bairdii*, a much darker green, the black bands wider, the spots pale yellow. Yet, on looking over a large number of the larvæ of each form, some of the *Bairdii* were as brilliant as the others, and in all points were like them. This might be expected of hybrid larvæ. As to the pupæ, I could see no difference in shape, and all were in general as in the *Asterias* group.

Eggs of so-called *Oregonia* laid 5th July, hatched 10th. The first moult was passed 14th and 15th; the second, 19th and 20th; the first to pass third was on 23rd; to pass fourth, 30th July; the first pupa, 9th of August; the first imago, 22nd August.

Length of the egg stage, 5 days.

Length of first larval stage, 4 days.

Length of second larval stage, 5 days.

Length of third larval stage, 4 days.

Length of fourth larval stage, 7 days.

Length of pupa stage, 13 days.

From laying of egg to imago, 38 days.

Eggs of *Bairdii* laid 8th July, hatched 12th. The first moult was passed 17th; the second, 23rd; the third, 27th; the fourth, August 2nd; pupation, 12th August. The first imago, 31st August.

Length of egg stage, 4 days.

Length of first larval stage, 5 days.

Length of second larval stage, 6 days.

Length of third larval stage, 4 days.

Length of fourth larval stage, 6 days.

Length of pupa stage, 19 days.

From laying of egg to imago, 44 days.

It becomes of importance to know the distribution of *P. Bairdii* and *Oregonia*, as well as the hybrid, *P. Brucei*. I have never seen an *Oregonia* from Arizona, but have received many *Bairdii* from that territory: some from the Wheeler expeditions, some from Mr. Morrison's catch. On the other hand, *Oregonia* flies in British Columbia, east of the Cascade Range, and perhaps in other districts. Dr. Hagen and Mr. Stretch took it in Washington in 1882; and the Doctor wrote a long paper which appeared in *Papilio* II., p. 149, in which he took the ground that *Zolicaon* and *Oregonia* were forms of *Machaon*, "not to be separated." He says nothing of having seen *Bairdii*, but, on page 160, says: "It is probable that *Brevicauda*, *Bairdii*, *Indra*, *Pergamus*, and probably *Americus*, all belong to *P. Asterias*." The Doctor's views of what constituted a species were somewhat hazy about that time. But we may conclude that he did not see *Bairdii* in Washington, or he would have expressly said so in his paper.

The only locality that I have been able, by correspondence, to discover, where *Bairdii* and *Oregonia* have both been found, is in Squaw Canon, Sioux Co., Nebraska. Prof. H. G. Barber, of the Univ. of Nebraska, at Lincoln, writes me that an *Oregonia* was taken in Squaw Canon in 1893, and an example of *Bairdii* in July, 1892; in different years, it will be noticed. Another specimen of *Oregonia*, Mr. Barber says, was taken on Lodge Pole Creek, in S.-E. Wyoming, in 1893; but no *Bairdii*. Prof. C. V. Piper, of the Washington Agr. College, at Pullman, Wash., sent me several typical *Oregonia* taken there and in the near-by district in Idaho; but he had seen no *Bairdii*.

(Nothing surprised me more than seeing our Eastern robin, *T. migratorius*, hopping about the lawn at Glenwood Springs, and I learned from Mr. Bruce that it is common throughout Colorado: on the high peaks even, above timber; where it nests in the crevices of the rocks. But if anywhere on those heights a miner's cabin is built, the robins come, and always keep about it.)

SUPPLEMENTARY.

After the foregoing paper went to printer, I received from Mr. Bruce a statement of the results obtained thus far from the pupæ of so-called *Oregonia* and *Bairdii* in his charge, and before spoken of. Thus:

1. *Oregonia* pupæ gave—

1. In fall of 1894, 5 *Bairdii*: 4 ♂, 1 ♀.

2 *Oregonia*: 1 ♂, 1 ♀.

2. In spring of 1895, 9 *Bairdii*: 6 ♂, 3 ♀.
 7 *Oregonia*: 4 ♂, 3 ♀.
2. *Bairdii*, first brood—
1. In fall of 1894, 7 *Bairdii*: 5 ♂, 2 ♀.
 2 *Oregonia*: 2 ♀.
2. In spring of 1895, 8 *Bairdii*: 6 ♂, 2 ♀.
 4 *Oregonia*: 4 ♀.
3. *Bairdii*, second brood—
1. In fall of 1894, 3 *Bairdii*: 3 ♀.
 1 *Oregonia*: 1 ♂.
1. In spring of 1895, 5 *Bairdii*: 3 ♂, 2 ♀.
 4 *Oregonia*: 2 ♂, 2 ♀.

From *Oregonia*, fall and spring: 9 *Oregonia*, 14 *Bairdii*.

" *Bairdii*, " " 11 " 23 "

Total: *Oregonia*, 20; *Bairdii*, 37. *Oregonia* being to *Bairdii* as 1 to 1.85. More *Oregonia* in proportion than came from the three broods I had.

It appears that each of the six broods described, 2 of *Oregonia*, 4 of *Bairdii*, gave examples of imago of its own form, and also of the other form.

Neither Mr. Bruce nor myself have obtained a *Hollandii*, and the true position of that form remains to be determined hereafter.

NOTES ON SOME SOUTHERN LEPIDOPTERA.

BY HARRISON G. DYAR, A. M.

Suborder FRENATÆ, Superfamily Microlepidoptera.

Family PSYCHIDÆ.

Oiketicus Townsendi, Cockerell.

1893—Dyar, Ent. News, IV., 321 note. (No name.)

1894—Dyar, Ann. N. Y. Acad. Sci., VIII., 205 (fig. of larval setæ).

1895—Cockerell, Bull. 15, New Mex. Agr. Ex. Sta., pl. fig. 7, 7a.

1895—Cockerell, Ann. Mag. Nat. Hist., (6) XV., 208.

Venation.—Primaries—Vein 1 (IX.) twice angled, branch to margin (XI.), branch to 1C (VIII.), which is faint toward base; median (cubitus) 4-branched, 4-5 (V., V.) stalked; 6 (V.) from cross-vein, the false discal (media) joining 7 (III.) just below apex; 8-9 (III., III.) stalked, 10 (III.) from cell,* 11 (II.) from base.

*The fore wing has 11 veins, vein III₂ being absent. *T. cphemeriformis* has also 11 veins, but it is V₂ which is absent; *O. Abbottii* has all 12 veins present.

Secondaries.—Three internal veins. Median (cubitus) 4-branched; 4-5 (v_2 , v_3) stalked; 6 (v_1) above angle of cell; 7 (III.) from cross-vein joining end of cell with 8 (II.); false discal (media) furcate; frenulum large. Wing shape nearer Thyridopteryx than Oiketicus, but colour of the latter. Primaries less drawn out at apex; secondaries less pointed than in *O. Abbotii*. Larval case built on the type of *Thyridopteryx*.

Colour umber-brown (Ridgway III. 14), paler than *Abbotii*; secondaries scarcely tinged with smoky outwardly; body a little darker than the wings. Primaries brown, palest in the area below the cell, the terminal portion between end of cell and margin a shade darker. A vitreous bar at the end of the cell covering the cross-vein as in *O. Abbotii*. A blackish-brown shade fills the cell and obtains slightly in the interspace between veins 6-8 just beyond the vitreous bar and in an oblique shade from lower corner of cell, directed towards anal angle. A black shade below vein 1 at base, extending as far as the branch to the margin. Subcostal and median veins less closely approximated than in *O. Abbotii*, so that the blackish space is more pointedly triangular and extends narrowly to base. Below all brown, the vitreous space only showing. Expanse, 36.5 mm; length, 20 mm.

O. Townsendi is nearer the genus *Thyridopteryx* than *Oiketicus*, though not structurally identical with either.

Family MEGALOPYGIDÆ.

Specimens of the species figured by Stoll as *Amanda* were received from Colombia under the generic term *Artace*. In Kirby's catalogue it stands as *Dryocampa* (?) *amanda*, following Walker. Even a casual examination is sufficient to show that it does not belong to either of these genera, and, indeed, to neither the *Lasiocampidæ* nor the *Citheroniidæ*. A glance at the accompanying figure of the venation will show that the moth belongs to the group of the more specialized *Microlepidoptera*, and I am in doubt whether to refer it to the *Eucleidæ* (*Limacodidæ*) or to the *Megalopygidæ*. The *Megalopygidæ* are essentially *Eucleids* with hairy larvæ, or, rather, the *Eucleidæ* are the more specialized type which have lost the larval hairs. In the absence of any knowledge of the larva of *amanda*, I am in doubt as to its position. I have separated these families by the characters of their antennæ; this applies to the North American species only, and fails when we consider the *Eucleidæ* of the world. Therefore I have at present no positive diagnostic character to separate the imagines of these families.

I venture to propose a new generic term for this species, to be provisionally referred to the Megalopygidæ.

Brachycodion, n. gen.

Male antennæ broadly pectinate for less than basal half, the rest short serrate; of female, simple. Head sunken, eyes large, palpi short, porrect, not reaching the front; legs subequal, the tibiæ slightly shorter than the femora, the tarsi very slightly longer than the femora, smooth; no epiphysis; anterior tibiæ unarmed, the middle and posterior with a pair of very short apical spurs. Venation as in the figures. [Venation of *Brachycodion amanda*, Stoll.

Rt. = retinaculum of the frenulum in ♂. Figs. 21 and 22.]

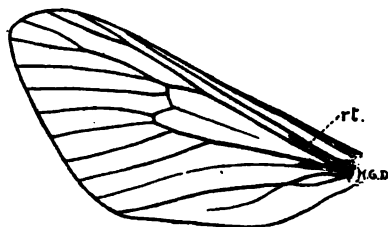


FIG. 21.

Retinaculum of the frenulum in male a long fold from vein 12 and a shorter reversed one from vein 10; in female, only the latter fold; frenulum well-developed. Body robust,

the thorax in width almost equalling one-third of the length of the costa, as long as wide; clothed with dense, short, suberect scaly hairs. Abdomen exceeding secondaries in male, scarcely so in female. The wing scales are spatulate with evenly-rounded ends or rounded triangular, conspicuously striate, on the secondaries produced into long hairs.

The following synopsis of genera has been revised and enlarged from that which I have previously given:—

Vein 7 arising nearer base than vein 9.

Vein 10 on a stalk with 11; male antennæ pectinate at base *Brachycodion*.

Vein 10 on a stalk with 7-9; male antennæ pectinate to tip. *Eupoeya*.

Vein 7 arising beyond 9.

Veins 3-4 of secondaries stalked or from same point. *Carama*.

Veins 3-4 of secondaries not stalked, separate.

Veins 4-5 of primaries short stalked. *Mesocia*.

These veins not stalked.

Vein 8 of secondaries united to 7 to outer third of cell or less.

Large species; primaries produced. *Podalia*.

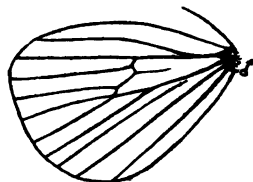


FIG. 22.

Small species ; primaries rounded *Ochrosoma*.
 Vein 8 united to 7 nearly to tip of cell.

Female vein 10 of primaries on stalk with 7-9 ;
 frenulum distinct *Sciathos*.

Female vein 10 from cell ; male short stalked ; fren-
 ulum rudimentary *Megalopyge*.

As indicated above, I find that *Megalopyge orsilochus* is not congeneric with the other species, and Walker's name may be restored for it. The moth is less modified than *Megalopyge* ; the male frenulum is distinct, and on primaries the costal loop is very well-developed. In *Megalopyge* proper it has disappeared. While *Megalopyge* has one or two branches from vein 1 on primaries, *Podalia* has three such, having developed supplementary veins for the strengthening of the internal margin.

Prof. Comstock has interpreted the single branch of vein 1, found in our species of *Megalopyge*, to be the remains of the first internal vein ;* but in *M. lanata*, male, this vein is forked, and it seems scarcely clear whether the whole structure may not be a neomorph. It is rather characteristic of the *Megalopygidæ* to have this structure, though in the female of *Sciathos* it is a mere rudiment and it is absent in *Eupoeya*.†

Family EUCLEIDÆ.

The genus *Euryda* H.-S. contains in Kirby's catalogue three species. One of these, *leucostigma*, Sepp, is referred, in the appendix, to the *Arctiidæ*, where it evidently belongs ; another, *lohor*, Moore, belongs to the genus *Belippa*, according to Hampson ; and we have left only the type *hipparchia*, Cramer. I have both sexes of this species before me. It belongs to the genus *Phobetron*. Stoll figures the larva, and it is not to be distinguished from our *P. pitheciium*.

I think it will be preferable to refer *Limacodes Beutenmuelleri*, Hy. Edw., also to this genus. In placing it in *Semyra* I followed Kirby, and I have not seen the type of *Semyra* in nature. Walker's description of the type (*S. coarctata*) implies a species allied to *Euclea* and *Sibine*, and can scarcely be near *Phobetron*, from which *Beutenmuelleri* does not differ essentially.

*Evolution and Taxonomy, Wilder Quarter Century Book, p. 81.

†Until the larva of *Eupoeya* is known, we can not be sure that it does not belong to the *Eucleidæ*.

Genus PHOBETRON, Hubn. (= Ecnomidia, Westw., = Euryda, H.-S.).

- 1 *P. pithecius*, A. & S. (= *abbotana*, Hubn., = *nigricans*, Pack., = *hyalinum*, Walsh, = *tetradactylus*, Walsh).
- 2 *P. hipparchia*, Cram. (= *violaris*, H.-S.).
- 3 *P. Beutenmuelleri*, Hy. Edw.

Synopsis of differences.

Primaries of female without a distinct ochereous patch at apex ; t. p. line regularly dentate ; wings of male largely hyaline... *pithecius*.

Primaries of female with an ochereous patch at apex ; t. p. line obscure.

Expanse of female, 30 mm. or more ; secondaries with reddish tinge ; ochereous patches on primaries distinct ; male darker, with a hyaline patch on wings..... *hipparchia*.

Expanse of female, 25 mm. ; more fragile ; secondaries without reddish tint ; the ochereous spots on primaries smaller and less distinct..... *Beutenmuelleri*.

SUPERFAMILY NOCTUINA.

Family LASIOCAMPIDÆ.

Tolyte brevicrista, n. sp.

This species seems not to be referred to in the *Biologia Centrali Americana*, nor in the subsequent writings of Mr. Druce or Mr. Schaus, so far as I am aware.

Types: A male in my collection probably from Mexico; one from Mr. T. D. A. Cockerell, Las Cruces, New Mexico (R. R. Larkin). Also a specimen in the Edwards collection labelled Arizona.

Male.—White ; eyes bordered with blackish ; abdomen faintly banded with pale gray. On thorax, posteriorly, a small median tuft of metallic blue-black flattened spatulate hairs, not curled, and not extending forward to middle of thorax. Wings white, the primaries crossed by seven gray, or blackish-gray, bands, in the pattern of *Tolyte velleda*. The three basal, narrow, rather faint ; fourth beyond end of cell touching third at inner margin, and approximate to it on costa but remote centrally, angulated outward on veins 4 and 8 ; beyond this three more bands, the last terminal, broad, separated by narrow white spaces ; the fifth and sixth almost united in the dark N. M. specimen, well separated in mine ; outer edge of sixth band a little irregular on the veins. Fringe and veins white. Below, the markings are faintly repeated, but washed with white. Pectinations of antennæ brown.

In my specimen the third band is partly obsolete, and all are fainter and paler than in the N. M. example ; the white spaces are wider, so that the third and fourth bands are not approximate at either costa or margin.

Expanse, 32.5 mm.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XIII. THE CLERIDÆ OF ONTARIO AND QUEBEC.

The Cleridæ are a rather small family of beetles, but make up for their comparative scarcity by the beauty of form and colour shown by many of them. As a rule, they may be easily recognized by their resemblance to a few common types such as are found in all cabinets, and agree in possessing the following family characteristics: The antennæ are usually serrate, with the outer joints enlarged, forming an open or more rarely a compact club ; the tarsi are five-jointed, the first or fourth joint often very small and indistinct, all but the fifth furnished with membranous appendages. The ventral segments are free, the first not elongate, and the hind coxæ are flat. In habits they are diverse, but most of them may be found in the perfect state, during the summer months, on flowers, leaves or freshly-cut timber, while *Necrobia* lives about dry carrion, and may even at times do a certain amount of damage in museums by preying upon dry specimens of various sorts, since the species are easily carried from place to place, like *Anthrenus*. In this way they were introduced from Florida into the museum of the University of Iowa, and have continued to breed there in small numbers. The larvæ of *Trichodes*, *Clerus*, and allied genera are said to feed on the young of other insects, and to be found in the nests of bees or under bark of trees infested by wood-boring larvæ of various sorts.

A great many species of *Cymatodera* and allied forms do not extend into high northern latitudes, and we find in consequence that the Canadian fauna does not show a very good representation in the family, only a little over thirty having been reported from the region under consideration. These are included in thirteen genera which may be separated by the following table. Care must be taken in the study of the tarsi, though after a little practice a specimen can usually be placed in its proper position without much trouble :—

- A. Tarsi with fourth joint about equal to third, flanks of thorax continuous with disk. Middle coxæ moderately distant (except in *Hydnocera*).
- b. Tarsi distinctly 5-jointed, first joint not shorter than second; antennæ 11-jointed, serrate; eyes coarsely granulate. *Cymatodera*.
- bb. Tarsi apparently 4-jointed, the first joint small, usually visible only from below.
- c. Eyes moderate in size and emarginate in front.
- d. Antennæ serrate, eyes strongly granulated. *Priocera*.
- dd. Antennæ usually distinctly clavate, eyes finely granulated.
- e. Last joint of maxillary palpi broader than the preceding; thorax and legs blue, shining; elytra blue or violet with red bands or the reverse. *Trichodes*.
- ee. Last joint of maxillary palpi slender.
Posterior tarsi rather broadly dilated. *Clerus*.
Posterior tarsi longer and slender. *Thanasimus*.
- cc. Eyes not emarginate, often very large and prominent.
Antennæ stout, club 3-jointed, not abrupt. . . *Thaneroclerus*.
Antennæ slender, club sub-globose. *Hydnocera*.
- AA. Tarsi with the fourth joint very small, forming merely an enlargement at the base of the fifth; flanks of prothorax separated from the disk (except in *Ichneä*) by a more or less distinctly elevated margin. Middle coxæ contiguous or slightly separate.
- f. Antennæ with outer joints flattened, and triangular or inwardly prolonged.
- g. Eyes with an internal emargination.
Club of antennæ 3-jointed, not longer than the other portion. *Phyllobanus*.
Club 3-jointed, each joint as long as basal portion. . . *Ichneä*.
- gg. Eyes with a frontal emargination.
First joint of tarsus equal to second, anterior tibiæ serrate externally. *Chariessa*.
First joint of tarsus small, inferior; eyes coarsely granulate. *Orthopleura*.
- ff. Antennæ with a small compact club.
Smaller; above reddish to blackish. *Laricobius*.
Larger; above bright blue, with or without reddish markings. *Necrobia*.

CYMATODERA, Gray.

The two Canadian species are of elongate form and readily distinguished thus:—

Black, thorax yellow, basal and apical margins black; femora at basal half and two basal joints of antennæ yellow. .30

— .36 in. *bicolor*, Say.

Brownish or piceous, antennæ ferruginous, legs brownish, the coxæ and tarsi paler. .30— .36 in. *inornata*, Say.

PRIOCERA, Lec.

The only species is *P. castanea*, Newm., known by the generic characters. In colour it is rufous, shining, with long, sparse pubescence. Each elytron with two yellow spots near the middle, and a broad black band. Occasionally there is an additional small yellow spot at base. The feet are piceous. .25— .40 in.

TRICHODES, Hbst.

These are very pretty blue or black insects, banded with red or yellow, found on flowers, especially Umbelliferæ, during the summer. The two Canadian species separate easily thus:—



Fig. 17.

Elytra rather finely punctate, bluish, with basal, median and subapical red or yellow bands. .40 in. (fig.

17). *Nuttalli*, Kirby.

Elytra coarsely deeply punctured, red with two transverse bands and tip black. .46— .60 in. *apivorus*, Germ.

The figure of *T. Nuttalli* is made from a specimen showing rather less red than usual, the extent of this colour being quite variable. In the Western Provinces it is replaced by

T. ornatus, Say, a still more variable species, in which the middle band is always more oblique than in *Nuttalli*; anterior to this band is usually found a very distinct red or yellow subsutural spot on each elytron.

CLERUS, Geoffr.

Several species of this genus vary so much in colour as to make their recognition from description rather difficult. The abdomen, for example, may be (in *quadriguttatus*) either rufous or black, and in some others the elytral ornamentation varies greatly. They may be found about flowers or on freshly-cut timber, resorting to the latter probably for the purpose of egg-laying, since the larvæ prey on those of wood-boring insects. The Canadian forms separate thus, though intermediate patterns of coloration, which I have not seen, may perhaps occur:—

- A. Elytra broadly rufous at base, head and thorax rufous, varying rarely to blackish. Elytra with transverse black and cinereous bands. .20-.28 in. *quadriguttatus*, Oliv.
- AA. Elytra at base black or only narrowly rufous.
- Thorax and head rufous; elytra with basal or sub-basal, postmedian and apical band black, sub-apical band cinereous. .42 in.
(fig. 18)..... *ichneumoneus*, Fabr.
- Thorax rufous, with a large baso-median black spot; head and elytra black. .20-.27
in..... *thoracicus*, Oliv.
- Thorax, head and elytra black; the last with three cinereous bands, of which the posterior is widest, and apical or subapical in position. .27- 35 in. *nigriventris*, Lec.
- Near the Pacific Coast we find also *C. sphaeus*, Fabr., which is about the colour above of *C. nigriventris*, but larger (.34 in.), and the abdomen is red, while the elytra have a very wide median and small apical cinereous band.



Fig. 18.

THANASIMUS, Latr.

The character given for the separation of this genus from *Clerus* is not very evident, and most reliance must be placed on the specific descriptions, which have been made moderately full. There is the same tendency to colour-variation as in most other genera in this family. The characters of the Canadian forms are as follows:—

- Elytra rufous, with broad median band and tip black, intermediate band cinereous. Feet black. .39-.51 in. *trifasciatus*, Say.
- Elytra rufous at base, dark posteriorly with two cinereous or whitish fasciæ; beneath rufous. .34 in. *dubius*, Fabr.
- Elytra black, very narrowly rufous at base, with two cinereous bands, of which the anterior is shaped like a w and narrower than the posterior, which is not undulated; thorax reddish, anterior margin piceous, post-pectus black at middle. .20-.30 in. *undatulus*, Say.
- Elytra black with two undulate cinereous fasciæ, the posterior broader; thorax black, abdomen and feet rufous. .30-.38 in. *nubilus*, Klug.
- Elytra black, the suture anteriorly cinereous, and two bands of the same colour; the posterior broader, outer row of punctures extending beyond the middle; abdomen sanguineous, thorax and legs black. .30 in. *rubriventris*, Lec.

Of the above, *rubriventris* is considered a variety of *dubius*, and *nubilus*, in a like manner, of *undatulus*. Some allowance must be made for colour variation, but, as a rule, specimens may be easily assigned to their proper places by the table.

THANEROCLERUS, Spin.

T. sanguineus, Say, is easily recognized among the Canadian species of this family by its colour, the head and thorax being obscure brownish, while the elytra are sanguineous. Length about .20 in.

HYDROCERA, Newm.

Smaller and more slender insects than most of the other Cleridæ, found commonly on foliage, and easily obtained by beating or sweeping. The eyes are very large and prominent, as in *Cicindela* and *Stenus*, to which latter genus a few of them bear, at first sight, considerable resemblance. Some species have the elytra much shorter than the abdomen. Ordinarily well-marked specimens may be identified by the following table:—

A. Thorax not or only slightly longer than broad.

b. Punctuation of elytra confused.

Thorax with subacute lateral dilatation; elytra blackish with a narrow yellowish median fascia. .17 in. *unifasciata*, Say.

Thorax hardly acutely dilated at sides; elytra with the humerus usually broadly rufous, varying to entirely black; legs black or rufous. .17-.20 in. *humeralis*, Say.

Thorax with rounded lateral dilatation and profound anterior impression; anterior legs testaceous. .20

in. var. *cyanescens*, Lec.

bb. Punctuation of elytra distinct, the individual punctures evident.

Blackish-blue, polished, elytra without testaceous markings, legs black, tibiæ and tarsi sometimes more or less testaceous. .10 in. var. *difficilis*, Lec.

Black, antennæ and feet pale, elytra pale with the margin, apex, suture and median fascia black (these markings variously reduced). .17 in. (fig. 19) *pallipennis*, Say.

AA. Thorax distinctly longer than broad, elytra shorter than the abdomen, legs much elongate. Blackish species, base of elytra sometimes testaceous.

Thorax twice as long as broad, elytra slightly shorter than the abdomen. .19-.25 in. *tabida*, Lec.



Fig. 19

Thorax one-half longer than broad, elytra much shorter than the abdomen. .11 in. *longicollis*, Ziegl.

Of the above, both *cyanescens* and *difficilis* are considered varieties of *humeralis*, though, owing to the difference in sculpture, one of them is placed in a different division of the table from the others. The genus needs careful revision in the light of more material than is at my command.

PHYLLOBÆNUS, Spin.

Contains a rather small species, *P. dislocatus*, Say (.11-.17 in.), of a black colour and elongate form, the last three joints of the antennæ compressed, sub-triangular. The elytra are very coarsely punctured in rows, and ordinarily ornamented with a curved sub-basal and undulate median band of yellow, and an apical spot of the same colour. Either the first or last may be absent or the median one alone remain.

ICHNEA, Lap.

Represented in Canada by *I. laticornis*, Say, about .24 in. long, black, linear, the head vittate with yellow, thorax margined with the same colour, elytra with striæ of large punctures, the apical ones confused.

CHARIËSSA, Perty.

C. pilosa, Forst, is a beautiful velvety-black insect about .50 in. long, the thorax roseate with two broad black discal lines, usually confluent behind. The variety *onusta*, Say, (fig. 20) has these lines reduced or wanting, and the elytra margined with yellow.



Fig. 20

ORTHOPLEURA, Spin.

O. damicornis, Fabr., is black, thickly punctured, pilose, the thorax reddish. It varies in length from .25 to .38 in. The antennæ have the usual broadly dilated, compressed club of this group.

LARICOBIVS, Rosenh.

Of this genus, *L. Erichsoni*, found also in Europe, is the only Canadian species. It is a small brown insect about .10 in. long, with short black hairs, while the elytra are marked with rows of large quadrate punctures.

NECROBIA, Latr.

As the name indicates, the species are found about carrion, especially that which is in a dried state, and they form one of the most efficient scavengers on the Western plains. In colour they are blue, more or less polished, and sometimes marked with red. They easily separate thus :—

Thorax and base of elytra red (.21 in.).....*ruficollis*, Fabr.
 Thorax and elytra blue.

Legs reddish (.21-.25 in.).....*rufipes*, Fabr.

Legs blue or blackish (.17-.21 in.).....*violacea*, Linn.

Most of the papers treating of the North American Cleridæ are sadly out of date, and, in addition, very difficult or expensive to obtain. The list of titles following gives the chief of those that will aid the student:—

1841. Klug, J. C. F., Versuch einer systematischen Bestimmung und Auseinandersetzung der Gattungen und Arten der Clerii. Abh. d. Konigl. Akad. der Wissensch. zu Berlin, pp. 259-397, 2 pl.
 1844. Spinola, M. Essai monographique sur les Clérîtes. Gênes, 2 vols., pp. 386 and 226, 47 pl.
 1849. Leconte, J. L. Synopsis of the Coleopterous Insects of the group Cleridæ which inhabit the United States. Ann. N. Y. Lyc., V., pp. 9-35.
 1876. Horn, Geo. H. Synopsis of the species of Cymatodera and Trichodes of the United States. Trans. Am. Ent. Soc., V., pp. 220-232.

MISCELLANEOUS NOTES ON COCCIDÆ.

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEXICO.

(i.) *Lecanium*, sect. *Eulecanium*.

(1) *Lecanium carya*, Fitch, var. *canadense*, v. nov.

♀ scale smooth, shiny, red-brown, convex, malleate, but not or hardly plicate. Length 4, breadth 3, height 2 mm., varying to length 5, breadth 4, height 3 mm. (Some Maine specimens 6 mm. long.) Removed from the twigs, the scales leave an oval white mark. (Nappan scales are paler and more yellowish, also somewhat smaller. Posterior incision perhaps a little longer; scales also rather more tending to be plicate.)

♂ scale ordinary, rugulose.

♀ with 6-jointed antennæ, formula 326154; 3 considerably longer than the remaining joints put together; 1 with 2 hairs; 2 with 2 hairs at its end, one especially long; 3 with 2 hairs near its end; last joint with several hairs, one especially long. (Nappan antennæ practically the same, but 1 larger; 4 and 5 each show a hair; 6 hardly so long, formula 3 (126) 54. Maine antennæ show one long hair at end of 3, 2 with one very long hair; 2 a little longer than 4; 4 a very little longer than 5; 6 a little longer than 2; formula 36245.) Derm obscurely tessellated, with large gland-pits. (In Maine specimens gland-pits frequently in pairs.)

Femur not much longer than tibia. Tarsus hardly $\frac{1}{3}$ shorter than tibia; distinctly swollen at base. Claw rather stout, curved at its tip like a falcon's beak. Digitules of tarsus apparently wanting (deciduous?). Digitules of claw large and distinct, extending well beyond tip of claw, stem moderately stout, knob large and oval. A bristle on end of coxa, one on end of femur, and one on end of tibia. (Nappan scales show legs much the same, but femur proportionately longer, tarsus only a little swollen at base; tarsal digitules well-developed, long, ordinary; digitules of claw short, not extending to end of claw; claw stout, nearly straight, not hooked. Maine examples show coxa stout, broader at base than its length, with a hair at its tip; trochanter with a long hair; femur longer than tibia, tarsus about $\frac{1}{3}$ shorter than tibia; digitules all filiform.)

Eggs (Maine specimens) very pale pinkish.

Hab.: The types are from Stittsville, about 20 miles from Ottawa, on *Ulmus racemosa*, sent by Mr. Fletcher. Other specimens are from Nappan, Nova Scotia, on elm (Fletcher), and Orono, Maine, on elm (Harvey). Prof. F. L. Harvey states that it is very abundant at Orono; he has known it for eight years, and it is increasing. The branches are often almost covered with them.

The Stittsville examples are affected by a Coccinellid, and by an Encyrtid parasite, perhaps a *Chiloneurus*.

The species is quite different from the European *Lecanium ulmi*, and is doubtless a native of this country. It illustrates well the extreme difficulty of dealing with the American species of *Eulecanium*, which have, perhaps, not succeeded in reaching a condition of specific equilibrium since the new developments which doubtless followed the termination of the glacial epoch. It will be seen from the above that the characters given are quite variable, unless we are dealing with three species instead of one—a view which I cannot for a moment entertain. While thus convinced that all these elm forms are strictly one thing, I have a very lively conviction that *L. ribis*, Fitch, is different—a conviction which I feel sure would be shared by any one who had seen quantities of both—yet it is difficult to point out the precise nature of the difference, apart from the smaller size of *ribis*. Two species of Fitch, *L. cynosbati* and *L. carya*, have been redescribed by Signoret, who shows that they have 6-jointed antennæ like *ribis* and *canadense*. I have not seen authentic examples of either, but the description of *L. carya* agrees so nearly with our elm species that I place the latter under it as a variety.

(2) *Lecanium ribis*, Fitch.

This species may be known by its comparatively small size, and 6-jointed antennæ, with the third joint very long. There are two long hairs almost at the end of the third joint. The derm shows large gland-pits, often in pairs. The insect reminds one of *L. hemisphæricum*, but it is a true *Eulecanium*. It is not confined to *Ribes* by any means. Dr. Lintner sent me specimens found by Hon. G. W. Clinton, on *Ostrya* and *Carpinus*, in Albany Rural Cemetery, June, 1885. These were 3 mm. long, 2 broad, 2¼ high. Just lately, Prof. Webster has sent it plentifully, infesting mulberry in Southern Ohio. The specimens are a little larger than usual, but clearly *ribis*. This attack on mulberry—a tree hitherto very free from insects in this country—is apparently a serious matter, and will doubtless be fully investigated by Prof. Webster. The *L. mori*, Sign., found on mulberry in the Savoy (Europe), is quite different.

(3) *Lecanium Fitchii*, Signoret.

On wild blackberry, Medina County, Northern Ohio, sent by Prof. F. M. Webster. The specimens have 8-jointed antennæ. I think this is the most western locality in which the species has yet been found.

Lecanium quercitronis, Fitch.

Mr. V. H. Lowe sends this on ironwood, but omits to state when it was found. Hitherto it has only been known on oak. The antennæ are 7-jointed. The newly-hatched larva is very pale yellowish, with a pale gray dorsal band.*

Certain forms of *Lecanium* found on oak and rose at Manitou, Colorado (Gillette), and on rose at Santa Fé, N. M., have given me a lot of trouble, and even now I do not know what to call them. It was at first questioned whether the rose species might not be the European *L. rosarum*, introduced, but it now seems tolerably certain that such is not the case.† It was hoped that they could be classified by the antennæ, but the more specimens examined, the greater grew the confusion, owing to the variability observed. Mr. Joseph Bennett, when a student at the N. M. College, examined these forms and found the antennæ thus :—

*Compare the young of *L. Fitchii*. The lately-hatched young of species of *Lecanium* differ more or less in appearance. Thus, the living young of *L. armeniacum*, Craw, sent by Mr. Ehrhorn from Sta. Clara Co., California, are pale gray mottled with white, with a conspicuous white or yellowish-white dorsal longitudinal band. Miss Tyrell considers *armeniaceum* a variety of *pruinoseum*, which probably is correct.

†It is also quite distinct from *L. pruinoseum*, Cog., which Mr. Ehrhorn sends me on rose from Mountain View, California.

- (a) On oak, Manitou. . . Antennæ 8-jointed, formula 3 (24) 18 (567).
- (b) On rose, Santa Fé. . . " 8-jointed, " 38 (12) 45 (67).
- (c) On rose, Manitou. . . " 7-jointed, " 3 (24) (17) (56).

Later, I myself obtained the following results :—

- (b) On rose, Santa Fé. . . Antennæ 8-jointed, formula 4 (31) (28) (567).

Joint 4 was a very little longer than 3.

- (a) On oak, Manitou. . . Antennæ 7-jointed, formula (34) (21) 7 (56).

I asked Prof. Gillette for more abundant material of the Manitou forms, and he sent them in quantity, but even then I could reach no certain conclusions. It appears, at all events, that the antennæ, *never* 6-jointed as in *ribis* and *canadense*, may have either 7 or 8 joints in the same form. Further, that while the third joint is usually the longest (as in *quercitronis*), 4 may be equal to it or even a little longer. In every instance, 5, 6, 7 are the three shortest, but when there are only 7 joints, 7 will be longer than 5 or 6. The differences seen in the formula given are not so important as might appear, for the slightest change in the length of a joint may alter the formula where several joints are so nearly of one length.

In general appearance, these scales are much alike, and do not differ in any marked degree from *L. quercitronis*. In fact, unsatisfactory as I feel the conclusion to be, I see nothing for it but to call them all *L. quercitronis*, var., at least until further studies of the living insects in all stages can be made. The differences between these *quercitronis* forms and *Fitchii* will also have to be clearly made out. Here again, the antennæ will not assist us. I think *Fitchii* and *quercitronis* must surely be distinct; but to *think* so is not to prove it—and the variability already observed in these forms throws doubt on formerly-accepted marks of distinction. The statements of Mr. Douglas regarding willow and rose species in England are suggestive in this respect.

It is much to be hoped that some of the Eastern and Canadian entomologists will study the biology of these perplexing forms. It is only by such means that we can arrive at sound conclusions. When dried specimens are sent to me, I can point out how they differ, but am left often in doubt as to how far the differences are specific, and how far due to ordinary variability, or even to the direct influence of the environment.

At Las Cruces, one day, I found a small *Eulecanium* on an umbellifer—one specimen only. It looked different from anything I had

seen, and the finding of a *Eulecanium* on an herbaceous plant was contrary to all preconceived ideas! What was I to do?—call it a new species? Close by was a peach tree, on which were a few ordinary *L. persica*, and here of course was the explanation. But had I sent the umbellifer scale away to some entomologist, with no information about the adjacent *persica*, I really don't see how he could have guessed what it was—the thing was so starved and altered by its unwonted food!

All these remarks will naturally tend to produce the impression—doubtless correct—that we have too many nominal species of *Eulecanium* in the books. But if we must distinguish species with caution, so also must we lump them with caution. It is a stupid way out of the difficulty to throw all those together that we cannot quite easily separate.

(5) *Lecanium robiniarum*, Douglas. In May, 1894, I bred a parasite from scales of this species found on locust in Las Cruces, N. M. Mr. Howard identifies it as *Blastothrix longipennis*, Howard, and states that it has previously been reared from several Lecaniines.

On osage-orange in Las Cruces, I find a scale just like *L. robiniarum*, but perhaps a little more shiny and more decidedly pruinose. But the eggs of the osage-orange form are always pure snow-white, while those of *L. robiniarum* are salmon-pink!

(ii.) *Lecanium*, other sections.

(6) *Lecanium perforatum*, Newstead. A flat species with 8-jointed antennæ, found on palms. Mr. Ehrhorn sent me specimens from a greenhouse in San Francisco. Miss Mary W. Tyrrell, of Oakland, sends me a very pretty enlarged photograph of this insect, which she regards as *L. tessellatum*, Signoret. While I cannot very well doubt that it is Newstead's *L. perforatum*, I must confess that I am not well-satisfied about its distinctness from *tessellatum*. It does not seem, however, to be the same as the Jamaican species on *lignum-vitæ*, which I had regarded as *tessellatum*, though the two things are very much alike. For the present, no more can be said, though it seems likely that the Jamaican insect will need a new name.

(7) *Lecanium oleæ* (Bern.). Prof. Toumey sends this on orange from Arizona; and Mr. Lataste found specimens in Chile, on *Yucca* in a garden. In both these cases it has of course been introduced.*

*In both cases the names of the exact localities were sent, but I regret that I am totally unable to decipher them. Will correspondents please write names of localities plainly?

(8) *Lecanium hemisphaericum*, Targ. On a house-fern belonging to Mrs. Fred. Lohman, in Las Cruces, N. M., I found this species and *Dactylopius longispinus*, Targ. These Coccids will not live out-of-doors in the climate of Las Cruces, so far as we know.

(9) *Lecanium insignicola*, Craw, emend. Mr. Ehrhorn sends me this, on *Pinus insignis*, from Golden Gate Park, San Francisco. The specimens belong to *Physokermes*, and we must write the species *Physokermes insignicola* (Craw).

(iii.) *Pulvinaria*, section of *P. camellicola*.

(10) *Pulvinaria camellifolia*, Sign., *P. urbicola*, Kkll., *P. simulans*, Kkll. These species need some further elucidation. The second is only known on *Capsicum* in Jamaica; the third only in Trinidad. We are supposed to have *P. camellicola* in this country, but I have never seen any with 6-jointed antennæ, as described by Signoret. Here is a short description of our insect:—

♀ remains brownish after boiling in potash. Tarsal digitules distinct and well-formed. Digitules of claw extremely large and stout, very broad at ends. A very long hair on end of trochanter. Marginal spines numerous and long. Lateral (stigmatal) incisions each with three spines, brownish and stout, one large, the other two small. Antennæ 8-jointed: 3 longest; 2, 4 and 8 subequal and next longest; 5 shorter than 4; 6 and 7 equal and shortest; 2 with a very long hair at the end; 3 with a moderately long hair at end; 5 with two very long hairs at end; 7 with a long hair; 8 with many long hairs.

Hab.: Macon, Ga., Apr. 15, 1892, on *Euonymus*. (Div. Ent., No. 5029; received through Dr. Riley.)

Just lately, Prof. Townsend has found the same species in abundance at Brownsville, Texas. The antennæ are 8-jointed, as in the Macon ones, formula 32 (41) (58) 67. The name of the food plant is not known, but it is not camellia, nor capsicum.

Notwithstanding the external similarity (which counts for little in *Pulvinaria*), I do not see how we can reconcile the above with Signoret's account of *camellicola*, assuming the latter to be correct. In 1886 Douglas treated of *camellicola*, and perhaps threw new light on the matter, but I have not now access to his paper.

If we thus assume that our insect is not *camellicola*, is it *urbicola* or *simulans*? Unfortunately, we know these latter only from one locality each, and are not well-informed about their possible range of variation.

In the large digitules of the claw it resembles *simulans*; in the 8-jointed antennæ, *urbicola*. In the ovisac it rather resembles *simulans* than *urbicola*; in fact, its external appearance is practically the same. In *simulans* the fourth joint of the antenna is very short; in our insect it is much longer than 6 or 7, and somewhat longer than 5. This comes nearer to the condition of *urbicola*. All things considered, perhaps it would be best, for the present, to call our insect *P. simulans*, variety. *P. bigeloviae*, Ckll., is another species of the same group.

(iv.) *Asterolecanium*.

(11) *Asterolecanium pustulans* (Ckll.). On oleander from Honolulu; sent by Mr. Ehrhorn. Mr. Maskell has placed this as a synonym of *A. fimbriatum* = *Planchonia fimbriata*; but I have true (French) specimens of the latter, kindly sent by Mr. Howard, and it is a totally different thing. It is hardly necessary for me to say that I cannot in the least agree with Mr. Maskell's proposed synonymy of the species of *Planchonia* or *Asterolecanium*. As several of the rejected species are my own, I do not care to discuss the matter now, but will leave it to the judgment of other coccidologists who may have occasion to examine the several forms. In fact, Mr. Maskell himself (as I hear from him) is giving closer attention to the matter, and will, I doubt not, eventually revise his present classification.

(v.) *Dactylopius*, section without lateral tufts.

(12) *Dactylopius virgatus*, Ckll. This is a destructive species, hitherto only known from Jamaica. Prof. Townsend has just discovered it in numbers on a cactus and other plants at Brownsville, Texas. Fortunately, it is there preyed upon by a *Scymnus* larva and a Chalcidid, which Mr. Howard tells me will form a new genus of Bothriothoracini. In Trinidad, Mr. Urich has found a *Dactylopius* on *Croton*, which I cannot distinguish from *D. virgatus*, var. *farinosus*; although, curiously, it also seems identical with Mr. Newstead's *D. ceriferus*, found on *Croton* in India. If this is so, *ceriferus* falls as a synonym of *virgatus*. No more need be said now, as I believe the subject will hereafter be fully discussed by Messrs. Townsend and Urich.

(vi.) Various *Diaspinæ*.

(13) *Mytilaspis pomorum* (Bouché). In the mountains, at Mountain View, California, on *Cornus californicus*. Sent by Mr. Ehrhorn. The specimens show fewer glands in the groups than some from apple,

viz., caudolaterals, 9; cephalolaterals, 14; median, 8. Mr. Schaufuss sent me *M. pomorum* on *Cornus* from Saxony long ago.

(14) *Diaspis amygdali*, Tryon. (= *lanatus*). This evidently reached California from Japan. Mr. Ehrhorn sends me some on dwarf peach from Japan, in Japanese nursery at San José, California. Also a grayish form of the same on persimmon from Japan, found by Mr. Craw in his quarantine work. The latter form looks different from ordinary *amygdali*, but is clearly that species; it shows caudolateral groups of glands with 36 orifices, cephalolaterals, 43; median, 15. The grayish appearance is partly due to dirt. Mr. Ehrhorn says it also infests dwarf cherry.

(15) *Aulacaspis bromeliæ* (Kerner). On pineapple in conservatory at San José, California (Edw. M. Ehrhorn). The exuviae are nearly marginal.

(16) *Chionaspis assimilis*, Maskell. Sent by Mr. Ehrhorn. It was found by Mr. Craw on a tree from Australia, in the course of his quarantine work.

(17) *Chionaspis quercus*, Comst. On oaks at Dripping Spring, Organ Mts., N. M., 5,600 ft. (Ckll.). New to New Mexico.

(18) *Ischnaspis filiformis*, Dougl. Trinidad, West Indies. In extraordinary numbers on *Cycas revoluta*. (J. H. Hart.)

(vii.) *Aspidiotus*.

(19) *Aspidiotus juglans-regiae*, Comst., Southern California, on prune. (Edw. M. Ehrhorn.) This species is quite generally distributed in Las Cruces and Mesilla, N. M., but here always white (var. *albus*). Two days ago I found it in Mesilla on apple, pear and apricot. Nowhere does it increase like *perniciosus*, and it is a comparatively harmless species, though anything but desirable in an orchard.

(20) *Aspidiotus piricola*, Del Guercio. This species, lately described as new from Italy, has turned up on plum at San José, California, specimens having been sent by Mr. Ehrhorn. A mounted specimen is dated March 18, 1892, others 1894; so it has been in California for some time unrecognized. The following description, from Californian examples, is worth giving:—

♀ scale $1\frac{1}{2}$ mm. diam., flattened, circular, pale gray; with the exuviae covered normally by a thin film of secretion, and then hardly noticeable, but the film very easily rubbed off, when the shiny, orange-brown exuviae are conspicuously seen.

♀. Median lobes orange-brown, the others colourless. Median lobes large, prominent, well-developed, rounded at ends. The other lobes all very small and rudimentary; 2nd, 3rd, 4th and 5th pairs can be distinguished, becoming successively smaller; 2nd and 3rd very distinctly bifid. Small saccular incisions between the lobes. Five groups of ventral glands; all the groups rounded or oval, compact; median of 8, cephalolaterals, 13, caudolaterals, 8. Anal orifice circular, a little posterior to line of caudolateral groups, and a considerable distance from hind end.

A. ancylus differs by its dark scale, and the position of the anal orifice, &c. It is also clearly distinct from *Howardi*, *ostreaformis* and *juglans-regiæ*.

A. Howardi is still only known from Canon City; the Illinois specimens on cherry (W. G. Johnson), reported as such, prove on examination to be a slight variety of *A. ancylus*.

(21) *Aspidiotus ficus*, Ashm. On *Cocos nucifera* and *Oreodoxa regia*, Iacmel, Hayti, sent by Mr. F. Wolff. New to Hayti.

(22) *Aspidiotus destructor*, Sign. On cocoanut, San Juan, Porto Rico. Sent by Mr. J. D. Hall. New to Porto Rico, and the first Coccid-record for that island! It shows the grouped glands well: caudolaterals, 6; cephalolaterals, 10; median, 1 only.

THE BOREAL AMERICAN SPECIES OF PAMPHILA.

BY DR. HENRY SKINNER, PHILADELPHIA, PA.

There seems to be some misapprehension in regard to the validity of our species of *Pamphila*, and inasmuch as I have been studying our Hesperidæ for some years past, I thought some remarks on the subject would not be inappropriate. We now have in this genus ninety-six species as they would appear in a list according to the generally accepted specific values. With the exception of about two groups, I consider the species remarkably well defined and constant, and if you once become thoroughly familiar with them, there is not the slightest difficulty in separating any of them at sight. The great difficulty has been to determine them from descriptions, as the word pictures are often inadequate, and almost impossible to comprehend, as the descriptions seem to fit a number of species that may not be even very closely related. Many of the figures have also been failures to a great extent; this is particularly true of the difficult Comma group, which is in most collections in a condition akin to certain of our species of *Argynnis*, *Melitæa* and *Colias*.

The first group of species of uncertain value is the so-called *comma* group; this is named *comma* group because the species, so-called, resemble or are variations of an European species, *Pamphila comma*. I think it unwise to separate these forms of *comma* and consider them species, as the variation is almost endless, every locality seeming to produce a new one. I have received individuals of this group from Southern Texas to Assiniboia, and how much farther north or south they are found I do not know. Their western limit is the Pacific Ocean, and the eastern limit is perhaps not well-defined, being somewhere in Canada, and as far east as Colorado in the United States. I would limit the *comma* group proper to *Ruricola*, *Oregonia*, *Columbia*, *Colorado*, *Nevada*, *Manitoba*, *Juba*, *Assiniboia*, and any others that people care to name after the special localities where found. The fewer specimens one has of these variations the better off he is in regard to being able to determine them—if he has large series from various localities he is “at sea.” I have recently received a form from the mountains of Utah, which some ambitious lepidopterist might like to call *Utahensis*. There is one other group that presents some difficulty, and in which some species do not seem to me to be clearly defined—they are *sylvanoides*, *agricola*, *pratincta*, *milo*, *verus*, *mystes*, *siris*. I do not mean to say that all of these are not valid species, but that some of them seem variable and to run into each other, and some are hard to separate. The remaining species, as a rule, are remarkably distinct and have excellent characters. There is much work to be done in the genus in the way of correcting synonymy, and in a few cases there are actual synonyms, but in comparison to the great number of species the synonyms are few. As an example of the mixed synonymy, the following may be cited:—

Vitellius, Fabricius = *Vitellius*, Hubner = *Delaware*, Edwards.

Arogos, Bdl.-Lec. = *Vitellius*, Abb -Sm., = *Iowa*, Scudder.

All who have heretofore written on the subject have put *arogos* as a synonym of *cernes*, but Boisduval and Leconte knew *cernes*, which they figure, and also give a recognizable figure of *arogos*, a southern and western species. I hope to monograph the genus some day, and desire all the material I can get. I have all the species, with but few exceptions, and am very anxious to get these, either by purchase or exchange. I have been studying photography and the “half-tone” process, with a view of illustrating these interesting little fellows, but their non-actinic colours of black, yellow, orange, and red make them the most difficult things imaginable to reproduce in this way. I think, however, there is a great future for the illustration of natural history objects by photography.

NOTES UPON THE NORTH AMERICAN SATURNINA,
WITH LIST OF THE SPECIES.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

Of the three families of *Saturnina* found in North America, only the *Saturniidae* occurs in the European fauna. Conversely no analogue of the European *Aglia tau* * has been found in America. In a very interesting paper, Ann. Mag. N. Hist., Vol. XI., 1893, Dr. Packard says of this species: "*Aglia* appears to be a *Ceratocampid* in its earlier larval stages, the caterpillar in its final stage, however, and the moth being closely related to the *Saturnians*." This being so, it is clear that *Aglia* cannot be classed as a subfamily of *Citheronidae*, from which the habit and structure of the moth and the mode of pupation seem to exclude it. *Aglia* seems, in fact, a comprehensive type, showing characters of the other three families of *Saturnina*. The head and antennæ are compared by Dr. Packard to those of *Automeris io*. *Aglia* resembles *Telea* somewhat in maculation and colour, and the wings in repose are held as in this genus and *Callosamia*. In fact, the ♂ moth reminds one in many respects of *C. promethea*: the slender body, the ovate outline of the antennæ and especially their position, together with the ready diurnal flight. All these characters are opposed to the *Citheronidae*. The ♀ *Aglia tau* has remained in a more generalized condition. The group may be considered as higher than the *Hemileucidae*, with which it is allied in venation, and probably as entitled to family rank, as suggested by Dyar. We have shown, in 1866, that there is a general difference in antennal structure between the three families, *Saturniidae*, *Hemileucidae* and *Citheronidae*, and this notice has probably served as the basis for subsequent attempts to classify the *Saturnina* upon antennal structure. In the same paper, Ann. N. Y. Lyc. N. Hist., VIII., p. 378, we draw attention to the difference in pupation. The *Saturniidae* weave large and dense cocoons attached to objects free from and elevated above the surface of the earth; the *Hemileucidae* spin cocoons of slighter texture on or near the ground and granules of earthy matter are mixed with the web (*Automeris*), or in a surface cell among debris with no or little silk (*Hemileuca*); the *Citheronidae* enter the ground to form a cell beneath the surface, in which the naked pupa reposes, showing an analogy of

* This moth is very common in beech woods in this neighbourhood, Hildesheim, and almost everywhere in Central Europe. I should not wonder if it were in time imported by dealers, and then reported as indigenous to America, as I believe has been done with *Xyloicus pinastri*.

habit with the *Sphingina*. Consult also, for perhaps the earliest recognition of the relationship implied by the habit of pupation between the *Citheronida* and *Sphingina*, my "Notes on the Sphingidæ of Cuba," pp. 4-5, Phil., 1865. The larvæ of *Citheronia* and *Eacles* have the same peculiarity with the Hawk moths, that they change colour and wander restlessly about in searching for a place of entrance. The habit in pupation of *C. regalis* is described with interesting original details by Dr. Hamilton, CAN. ENT., XXI., 101. I believe the *Citheronida* to be exclusively American. For a note on the geographical distribution of the family, see CAN. ENT., XX., 76, 1888. Since, then, the two latter families are absent in Europe, we can only compare the *Saturnida* in the two faunæ. There are no identical, but probably one "representative" species, the Californian *Saturnia mendocino*, Behrens. When my good friend, Mr. James Behrens, sent me his MS. and type of the species (CAN. ENT., VIII., 149), I saw we had to do with a genuine *Saturnia*. Consult Behrens, CAN. ENT., VIII., 175, where the author says: "After examining my type of *Saturina mendocino*, Prof. Grote considers it a true *Saturnia* and points out that in its yellow hind wings it resembles *S. Carpini* ♂." I may say that had my determination been wrong, and Behrens's beautiful species belonged to an allied genus, say *Calosaturnia*, Sm., my theory that the California fauna contained some residuary palæarctic types, prevented by the mountains from spreading east, would have been damaged. But my determination holds good. I cannot now compare *mendocino* with the two smaller European forms, the types of *Heera*, Hubn., 1806, but it may well be that it "represents" *Saturnia pavonia minor*, L. I do not know *S. galbina*, Clem., which Neumoegen and Dyar make the type of *Agapema*, reversing Prof. J. B. Smith's determination of these two forms.

The nearest ally of *Saturnia* in our Eastern fauna is *Samia cecropia*, L., and I placed this genus next to *Saturnia* in my classification in Proc. Am. Phil. Soc., 1874, as well as in my Check List of 1882. Mr. Dyar had asked me to examine the larvæ of the European *Saturnia* unknown to him in nature, so as to see whether they agreed with his definition of the family. I did so, and found the tubercles prominent, no single tubercle on ninth segment. I was impressed by the resemblance between the full-grown larva of *Saturnia pavonia major* with that of our *Samia cecropia*. I sent Mr. Dyar then the prepared larvæ of the two European species in three stages, as his testimony in the matter would relieve my own doubt

that I was correct in my observation. Mr. Dyar kindly writes me upon the specimens as follows: "They are evidently true Saturnians, as you wrote them to be, but differ from any which I have seen before, in lacking the unpaired dorsal tubercle on eighth abdominal segment. The tubercle is absent also in *Anisota* (*Citheroniidae*), but in no other genus which I have yet seen. I thought at first that the unpaired tubercle was simply absent in *Anisota*, and wrote my first article on larvæ under that impression. But when I had the opportunity of studying the larvæ in stage I., I found that really the original tubercle i. remained unconsolidated, and ii. disappeared, just as on the more anterior segments. But in these Saturnians (*pavonia major* and *minor*) we cannot say whether i. is consolidated into an unpaired tubercle with its fellow and the structure lost, or whether i. is separate and ii. is gone. The first stage would probably not help us here, as the primitive first stage is lacking in all the Saturnians which I have seen. But, by analogy with *Anisota*, I conclude that i. is unconsolidated. *S. pavonia minor* is the more generalized form, when we come to consider the mature larva. *S. pavonia major* has suffered a modification in the evolution, and is more specialized. The secondary hairs are greatly reduced, but those that are left, together with the central setæ on the tubercles, are elongated and have acquired flattened and enlarged tips; the tubercles themselves stand up prominently and are coloured blue, strongly suggesting a simple form of our *Samia* type. I seem to see even a trace of the predominance of the subdorsal tubercles on meso- and metathoracic segments, which is so marked in the American forms. As to colour, the primitive black, seen in generalized larvæ like our Hemileucids, *Pseudohasis*, etc., is replaced gradually during ontogeny by green, as is done in *Samia*, etc., and in *Citheronia*. A beautiful adaptation to the environment."

Thus it appears from Mr. Dyar's study, that our *Samia cecropia* and allies are descendants of the same stock with the European *Saturnia*, while the position I have assigned to *Samia* as next to *Saturnia* is justified. There remains for me to point out some facts with regard to the formation of the cocoon in our American genera which induces my arrangement of the family. In *Attacus*, *Philosamia* and *Callosamia*, the larva attaches the deciduous leaf, which forms the basis and natural attachment for its web, firmly to the branchlet by a pedicel of silk. Evidently this is an acquired habit. It has been found more useful to the species that the cocoon be prevented from falling to the ground with

the fall of the leaf. *Telea* and *Actias* have not this habit. The cocoon falls in the autumn with the leaf which was used in the spinning. The Attacid group, with falcate fore wings and ovate secondaries, have generally this habit of attaching the cocoon. This proves at once the validity of *Callosamia*, which has the habit strongly developed, as compared with *Samia*, which has it not at all, but spins a thick double cocoon attached to the branches themselves, often near the ground and much after the fashion of the European *Saturnia*. I therefore place the genera with the pedicel habit at the commencement of the family, *Saturnia* and *Samia* following and closing with *Actias* and *Telea*, in which the thinner cocoon falls with the leaf to the ground. This study of the genera of our *Saturnida* leads virtually to the same arrangement as proposed by me in 1874; it places merely *Actias* and *Telea* together at the last, instead of commencing with them; the main point lies in the association of the genera which are naturally nearest, *Attacus*, *Philosamia*, *Callosamia*, and again *Samia* and *Saturnia*. Asking his opinion, Mr. Dyar kindly answers me that he would arrange the *Saturnina* "just like your list of 1882, except that *Thauma* and *Quadrina* should change places." I do not know *Thauma*; of *Quadrina* I had only the ♀ type, and I never possessed an example of *Gloveria*, with which Neumoegen and Dyar unite it, from a photograph of the venation furnished by Prof. Comstock, considering it the same as the European *Dendrolimus*, with the types of which I am also unacquainted. Those using the Philadelphia Check List should therefore alter the incorrect classification there adopted, for that in the New York Check List, as here amended in detail. I would also suggest, that the specimens in the National Museum in Washington be labelled to agree with the list given here, as their present labels must be, in large part, erroneous.

The first separation of the *Hemileucida* was by Grote and Robinson in 1866, under the name *Hemileucini*; while the genera of the *Dryocampini* grouped together in the same paper correspond to the family *Citheronida* of Dyar. I have elsewhere shown that Kirby is incorrect in giving *Laocoon* as the type of *Eacles*, Hubn. Verz. The type of *Eacles* is fixed by Dr. Packard in 1864; the two genera are distinct in all stages. The revision of the species of *Citheronia*, given by Grote and Robinson in 1866, has perhaps not been read by Mr. Kirby. I would follow Mr. Dyar in excluding the *Lacosomida* from the present series. I am indebted to Neumoegen and Dyar for details of synonymy and locality.

Family SATURNIDÆ.

Family type : *S. pavonia major*, L.

Gen. ATTACUS, Linn., 1767.

Type : *A. atlas*.

1. *erycina*, Shaw. South America to Mexico ; Texas ?
splendidus, Beauv.

2. *lorilla*, Westw.

cinctus, Tepp. Mexico to Arizona.

Gen. PHILOSAMIA, Grt., 1874.

Proc. Am. Phil. Soc., XIV., 258.

Type : *P. cynthia*.

3. *cynthia*, Drury. Atlantic Coast, introduced from Asia.

aurotus, Fabr.*insularis*, Voll.

Gen. CALLOSAMIA, Pack., 1864.

Type : *C. promethea*.

4. *calleta*, Westw. Mexico to Arizona.

polyommata, Tepp.

5. *promethea*, Drury. Canada, south and westward.

6. *angulifera*, Walk. Atlantic States ; Buffalo, probably Lower Canada.

Obs.—These three genera form the first group in the family ; the second consists of *Samia*, *Saturnia* and *Agapema* ; the third, of *Actias* and *Telea*.

Gen. SAMIA, Hubn., 1818 (1822 ?).

Type : *S. cecropia*. (Packard restr., 1864.)= *Platysamia*, Grt., 1865.

7. *cecropia*, Linn. Canada, southward.
8. *columbia*, S. I. Smith. Canada to Michigan ; Eastern States.
9. *Gloveri*, Streck. Arizona to Rocky Mountain region.
var. reducta, Neum. Mts. of Colorado, 11,000 ft.
10. *rubra*, Behr. (1855.) California to Pacific Northwest.
californica, Grt. (1865.)
ceanothi, Behr. (1868.)
euryalus, Streck. (1875.)

Gen. SATURNIA, Schrank, 1802.

Type : *S. pavonia major* (*pyri*).= *Heræa*, Hubn., 1806.

Type: *S. carpini*.

= || *Pavonia*, Hubn., 1818 (1822?).

= *Calosaturnia*, J. B. Smith, 1886.

Type: *S. mendocino*.

11. *mendocino*, *Behrens*. Northern coast region, California.

Gen. AGAPEMA, Neum. and Dyar, 1894.

Type: *A. galbina*.

12. *galbina*, *Clem.* Texas.

Gen. ACTIAS, Leach, 1819.

Type: *A. selene*.

= *Tropæa*, Hubn., 1818 (1822?).

Type: *A. luna*.

13. *luna*, *Linn.* Canada to Texas; Mexico.

var. dictynna, *Walk.*

var. Rossi, *Ross.*

Gen. TELEA, Hubn.

14. *polyphemus*, *Cram.* North America throughout.

paphia, *Linn.*

fenestra, *Perry.*

var. oculea, *Neum.*

Obs.—The late Mr. Hy. Edwards applied Mr. Walker's name in 1880 to a variety of *luna*, in which, as I remember, the outer margins of the wing showed a reddish band. I have not seen Mr. Walker's type. It is, I believe, that form of *luna*, found also in the north, which led Prof. Agassiz in 1860 to suspect a distinct species. The reference of *luna* to *Tropæa* is founded on the belief that the Asiatic species may belong to a distinct genus. I have not been able to compare them.

Family HEMILEUGIDÆ.

Pack., Ann. Mag. N. Hist., 173, 1893.

= *Hemileucini*, G. & R., 1866; Grote, 1874.

Family type *Hemileuca maia*.

Gen. AUTOMERIS, Hubn., 1818 (1822?).

Type: *A. janus*. (Grote restr., 1874.)

= *Hyperchiria*, Hubn. Verz.

Type: *A. io*. (Pack. restr., 1864.)

= || *Io*, Boisd., 1875.

1. *Zelleri*, G. & R. Texas.
2. *pamina*, *Neum.* Arizona.
var. aurosea, *Neum.*
3. *zephyria*, *Grt.* New Mexico.
4. *io*, *Fabr.* Canada, southward.

varia, Walk.

Fabricii, Boisd.

var. argus, N. & D.

♀ *var. lilith*, *Streck.* (Atlanta, Ga.)

Gen. *THAUMA*, Hy. Ed., 1875.

Type: *T. ribis*.

5. *socialis*, *Feisth.* West Coast, Vancouver to Chile.
angulifera, Walk.
ribis, Hy. Ed.

Gen. *COLORADIA*, Blake, 1863.

Type: *C. pandora*.

6. *pandora*, *Blake.* Rocky Mountain region.

Gen. *ARGYRAUGES*, *Grt.*, 1883.

Type: *A. Neumoegeni*.

7. *sororius*, *Hy. Ed.* Lower California.
8. *hualapai*, *Neum.* Arizona.
9. *Neumoegeni*, *Hy. Ed.* Arizona.

Gen. *HEMILEUCA*, Walk., 1855.

Type: *H. maia*. (G. & R. restr., 1866.)

= *Euchromia*, Pack., 1864.

= *Euleucophaeus*, Pack., 1872. (Grote ref., 1883.)

Type: *H. tricolor*.

10. *electra*, *Wright.* So. California.
11. *maia*, *Drury.* North America, throughout.

proserpina, *Fabr.*

var. nevadensis, *Stretch.*

lucina, *Hy. Ed.*

var. californica, *Wright.*

artemis, *Pack.*

12. *juno*, Pack. Mexico to Arizona.
yavapai, Neum.
13. *Grotei*, G. & R. Texas to Colorado.
diana, Pack.
14. *tricolor*, Pack. New Mexico; Utah.
Gen. PSEUDOHASIS, G. & R., 1866.
Type: *P. eglanterina*.
15. *eglanterina*, Boisd. Rocky Mts.; Arizona.
var. Nuttalli, Streck.
16. *shastaensis*, Behrens. Coast region of California; Mt. Shasta.
var. denudata, Neum.
17. *hera*, Harris. Rocky Mts; Eastern Oregon.
pica, Walk.
var. marcata, Neum.

Family CITHERONIDÆ.

Neum. & Dyar, 1894,
= *Dryocampini*, G. & R., 1866.
= || *Ceratocampidæ*, Auct.

Family type: *Citheronia regalis*.

Gen. EACLES, Hubn., 1818 (1822?).

Type: *E. imperialis*. (Pack. restr., 1864.)
= *Basilona*, Boisd., 1868.

1. *imperialis*, Drury. Lower Canada to Texas; Mexico.
imperatoria, Abb. & Sm.
didyma, Beauv.
var. punctatissima, Neum.
var. nobilis, Neum.

Gen. CITHERONIA, Hubn., 1818 (1822?).

Type: *C. regalis*.

= || *Ceratocampa*, Harris, 1834.

2. *regalis*, Fabr. Lower Canada to Southern States.
regia, Abb. & Sm.
var. infernalis, Streck.
var. saengeri, Neum.
3. *mexicana*, G. & R. Mexico.
4. *sepulcralis*, G. & R. Mass. to Florida.

Gen. SPHINGICAMPA, Walsh, 1864.

Type: *S. distigma*.

Grt., Proc. Am. Phil. Soc., 1874.

5. *albolineata*, G. & R. Mexico ; Texas ?

6. *Heiligbrodti*, Harvey. Arizona.

7. *bicolor*, Harris. Western States ; Mississippi Valley.

distigma, Walsh.

var. suprema, Neum.

var. immaculata, Jewett.

8. *quadrilineata*, G. & R. Mexico ; Texas.

9. *bisecta*, Lintn. Western States to Texas.

var. nebulosa, Neum.

Gen. ANISOTA, Hubn., 1818 (1822?).

Type: *A. stigma*. (Grt. restr., 1874.)

= *Dryocampa*, Harris, 1841.

10. *stigma*, Fabr. Atlantic States, westward.

11. *senatoria*, Abb. & Sm. Atlantic States, westward.

12. *virginiensis*, Drury. Canada, southwardly.

pellucida, Abb. & Sm.

13. *rubicunda*, Fabr. Canada, southwardly.

var. alba, Grt.

pallida, Bowles.

Obs.—This arrangement is that adopted by me in 1874. It is possible, when the larvæ of all the forms are known, it may be slightly altered. The relationship between the types of *Adelocephala*, Boisd., and the species included by me in the extension of *Sphingicampa*, is not known. I had been inclined to look upon *Sphingicampa* as a specialized form with more affinity to *Eacles* than to *Anisota*. I have not been able to compare the larvæ properly. I had endeavoured to rescue Harris's term *Dryocampa* for *Anisota rubicunda*; but the moth does not seem to offer distinct structural characters; hence, the collective term *Dryocampini*, G. & R., 1866, must also fall. Mr. Dyar writes me positively that he thinks *rubicunda* strictly congeneric with *Anisota*, both as larva and moth. The tubercles of *Anisota* are peculiar, and Mr. Dyar finds no difference between the species. I think this settles the matter, and that the present nomenclature of the *Saturnina* can be accepted without much reservation.

THE MARX COLLECTION OF ARACHNIDA.

The eminent arachnologist, Dr. George Marx, of Washington, D. C., died January 3rd, 1895. His important collection of Arachnida has been placed by his widow in charge of the undersigned committee of the Entomological Society of Washington, to be disposed of by sale. The collection is one of the most important in existence. It contains more than one thousand species of Aranaeina alone.

Of this one thousand species, about five hundred are described species from North America. These are distributed among 175 genera. The families Theridiidae, Epeiridae and Theraphosidae are particularly well-represented, and have been identified largely by some well-known authority. The Theridiidae were in the hands of the late Count Keyserling, and about thirty of his species have their types in this collection. The Theraphosidae have been recently in the hands of Simon, of Paris, while Dr. McCook has examined the Epeiridae. In addition to these 500 described American species, there are about 200 species of European spiders properly identified and labelled, and nearly 300 American species which bear Dr. Marx's manuscript names. There is, further, a great mass of material which has never been worked up.

The species are many of them represented by many specimens. The collection is contained in vials in Muller's fluid, and the vials are arranged in the standard trays of Dr. Marx's own invention, as figured and described in Riley's "Directions for Collecting and Preserving Insects" (Smithsonian Institution, Part F, Bulletin 39. U. S. National Museum). The collection is of special interest, aside from the number of species, on account of the excellent representation of the boreal fauna. There are many specimens from Alaska on the west and Labrador on the east. In addition, all parts of America north of Mexico are represented. Besides the Aranaeina there are many specimens of Scorpionida, Solpugida and Pseudoscorpionida, and Pedipalpi.

After due consideration, we have decided to offer, for the present, this collection for sale for the sum of fifteen hundred dollars (\$1,500).

Correspondence relative to the collection, or its possible purchase, may be addressed to any member of the committee :

C. V. RILEY, U. S. National Museum.

L. O. HOWARD, U. S. Department of Agriculture.

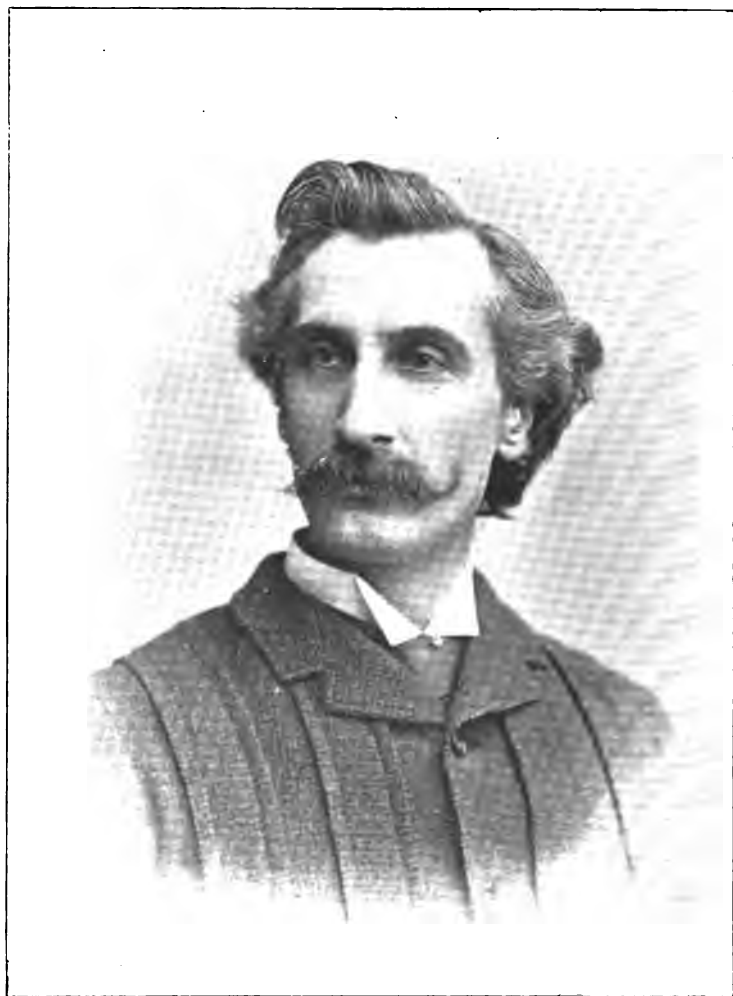
E. A. SCHWARZ, U. S. Department of Agriculture.

THEODORE GILL, Smithsonian Institution.

Washington, D. C., August 1st, 1895.

P. S.—With the collection will be delivered to the purchaser, Dr. Marx's large and valuable library on Arachnida, comprising all the important works on the group, well-bound, together with several hundred pamphlets.

Mailed September 7th, 1895.



PROF. C. V. RILEY, M. A., PH. D.

The Canadian Entomologist.

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No. 10.

CHARLES VALENTINE RILEY.

In the death of Prof. C. V. Riley, the world of practical science has lost one of its brightest lights. On the morning of September 14th, Prof. Riley left his home in Washington, on his bicycle, in company with his son, to ride into the city. Not many minutes after they had started the Professor's wheel struck a stone, and he was thrown so violently from his seat, against the curb, that his skull was fractured. He was picked up unconscious, and died some hours later.

Professor Riley was an Englishman by birth, having been born at Chelsea, September 18th, 1843. He was educated in England, France, and Germany. When seventeen years of age, he came to America and settled on a farm in Illinois. Here he began his first observations on injurious insects. Four years later he went to Chicago, and from that period on to the present time he has always been accorded a foremost place among the leaders of scientific thought in America.

In 1868, Prof. Riley was appointed State Entomologist of Missouri, and it was during his tenure of that office that he prepared his celebrated nine reports on the "Noxious, Beneficial, and other Insects of Missouri." In 1878, he was appointed Entomologist to the Bureau of Agriculture; he resigned soon after, but was reappointed again in June, 1881, and held the office until about a year ago.

Prof. Riley was a man of keen perception, and possessed of great perseverance and tenacity of purpose. He was an exceptionally accurate observer, and his writings are couched in a plain, unaffected style, which never leaves any doubt as to his meaning. His investigations were markedly original, and he seldom recorded anything he had not actually seen himself. His marvellous skill as an artist enabled him to add much to the value of his writings by many exquisitely drawn figures. All his work was characterized by system and thoroughness, and, as a consequence, his writings are most valuable, and very numerous. He was also a skilful administrator, and had a faculty for gathering around him the best men available for all special lines of study. Among

the many remarkable results of his work, there are three which will always be associated with his name: the invention of the Cyclone or Riley nozzle, the discovery of the kerosene emulsion, and the introduction of *Vedalia cardinalis*, through the agency of which, in controlling the Fluted Scale, the cultivation of citrus fruits is now possible in California. As a friend, he was kind, patient and true; as an economic entomologist, take him all in all, he was far and away the most eminent the world has ever seen. Every one who could appreciate this great man and his work, will deplore the sad accident which has cut off his career when he was still at the height of his physical and mental vigour.

J. F.

STUDIES IN N. A. MEMBRACIDÆ—III.

F. W. GODING, M. D., PH. D., RUTLAND, ILL.

Subfamily CENTROTINÆ, Stål.

Multareis, gen. nov.

Head broad, with an angle on each side below the eyes, margins parallel from base to apex, which is largely produced in a spoon-shape; base of the head nearly straight; ocelli a trifle nearer the eyes than to each other, on a line above the centre of the eyes; head, at inner edge of each eye, furnished with a compressed, dentiform tubercle projecting directly forward; head inflexed below the eyes. Prothorax convex, elevated some above lateral angles, at summit, on each side armed with a short, stout (truncated?) horn, the sides of which are continuous with those of the prothorax, projecting upward, and parallel; densely punctured; basal margin projecting in a transverse carina; furnished with a percurrent median carina; posterior process gradually narrowed to the apex, which is briefly recurved in a compressed tooth or lobule; the base almost completely covering the scutellum; dorsum of posterior process furnished with two rounded tubercles, the first located at the base of the anterior convexity, the second midway between it and the apex. Tegmina coriaceous, narrow, punctured, opaque, veins irregular and numerous; barely passing abdomen, far surpassing the apex of the posterior prothoracic process; corium with the venation very irregular towards apex, there being numerous discoidal and terminal areas varying greatly in size, and three basal areas; clavus attenuated gradually to apex; wings with four apical areas, the second minute, triangular. Front tibiæ moderately dilated, with a row of fine spines along the edges.

This genus is closely related to *Anomus*, Fairm., which, possibly, ought to be arranged to include the type of *Multareis*. It differs from *Anomus* in the shape of the head, curve of the apex of the posterior process, tegmina not broad, destitute of hairs, number of discoidal areas, presence of dorsal horns and tubercles on the front of the head; inflexed head, and tibiae.

Type *M. cornutus*, n. sp.

M. cornutus, n. sp.—♂, ♀. Light ferruginous, strongly punctured. In front of lateral angles, on each side, a tubercle in a fossa coloured black; tips of lateral angles, upper part of anterior swelling, horns and tip of second posterior tubercle dark ferruginous; tip of posterior process brownish-black; tegmina sordid ferruginous, veins dark brown, with two broad transverse bands, the first across the middle, the second between it and the apex sordid white; tegmina finely punctured, but uneven and rough. Abdomen dark brown, spindle-shaped and robust. Legs ferruginous.

Length, 4 mm.; breadth, $1\frac{1}{2}$ mm.

Habitat—Panamint Valley, Calif.

Described from a pair received from Prof. Riley. Types in collection F. W. G., and National Museum.

Tuberculocentrus, gen. nov.

Head convex, produced in the middle, large, uneven, coarsely punctured, about half as long as broad between the eyes, which are prominent; ocelli on a line through the centre of the eyes, much farther from each other than from the eyes. Prothorax between the shoulders elevated in a rounded hump, somewhat flattened on top, densely punctured, with a percurrent median carina; at the base, behind the eyes and in front of the lateral angles, on each side, is a large tubercle in a fossa; posterior process not reaching the tip of the abdomen, long, very broad at base, gradually narrowed to the beginning of the posterior third, where it is greatly constricted, then broadened considerably and ends at the apex in a sharp point; when seen from the side it is deeply sinuate behind the hump, slightly so before the apex, which is lightly elevated. Abdomen long and broad. Scutellum truncated. Tegmina broad, extending far beyond the tip of the abdomen, coriaceous, sub-transparent; the corium divided into innumerable small areas, no regular arrangement of the veins; clavus gradually attenuated to the apex. Tibiae triquetrous, not dilated, a row of fine spines on the edge. This is closely related to *Centrodentus*, Godg.


T. solus.—♀. n. sp. Sordid yellow, punctured, immaculate, eyes dark brown, antennæ black, abdomen lemon-yellow, ovipositor darker, tip of abdomen brown; tegmina at the interior angle coriaceous, a little darker, veins yellow; wings with three apical areas.

Length, 4 mm.; breadth, $1\frac{1}{2}$ mm.

Habitat—Death Valley, Calif.

Described from many species in the National Museum.

Subfamily DARNINÆ, Stal.

Stictopelta arizona, n. sp. — ♀. Yellow, lateral margins white. Head smooth, yellow, with a brown, transverse band just below the eyes, a darker spot near the eyes. Prothorax yellow, with a percurrent, longitudinal, median, impressed line; base narrowly brown, at the middle of the base a white line, thus: , the point resting at the base, the line becoming a band which extends around the lateral angles, along the inferior borders, ending just before the apex, which is brown: densely punctured; on each side of the base, under the curvature of the brace-shaped line, is a scar which is white in the centre with a dark brown ring. Tegmina nearly covered, the veins in the basal half nearly black, lighter towards apex. Below yellow; ovipositor fuscous.

Length, 9 mm.; width, 4 mm.

Habitat—Arizona. From Prof. Riley.

This is near *præcox*, Burm. Type in National Museum.

Subfamily SMILIINÆ, Stal.

Carynota vera, n. sp.—♀. Reddish, sprinkled with yellow; punctured; smallest member of the genus, closely resembling in shape various species of *Stictopelta*.

Head broad, short, very obtusely triangular, rough, yellowish-red, with three yellow dots arranged in a triangle, the apex at the base of the head, the other two containing the ocelli, which are much nearer to each other than to the eyes; a dark brown curved band across the lower part of the face; eyes prominent, dark. Prothorax less elevated than other *Carynotæ*, convex in front, rising in a curve over lateral angles, extending posteriorly to the apex without any depressions nor becoming flattened; an impression, originating from behind the lateral angles at the inferior borders, on each side, extends backward and upward, meeting on the dorsum at the middle of the posterior process directly across the median carina and not at an angle; the median carina is a smooth line, per-

current, dark brown ; the posterior process rounded and very acute at the tip, which does not quite reach apex of tegmina ; there is a shining, irregular black scar near the base of prothorax on each side ; the yellow atoms are sparingly scattered over the prothorax, except those on the dorsum, which are arranged in the form of an oblong oval ; a large triangular yellow spot, shaded with fuscous, on each side at the middle of the lateral borders ; the lateral borders for about one-fourth their length very narrowly yellow. Tegmina coriaceous and mostly opaque, densely punctured, reddish ; two discoidal cells, the exterior small, round and transparent, the interior larger, triangular and opaque ; the first and fifth apical cells transparent ; the third triangular and about as broad as long. Wings with four apical cells, the second sessile. Below yellowish-red ; femora yellow with a broad reddish band just above the tips ; tibiae triquetrous, hairy ; tarsi dark red.

Length, 7 mm. ; width, $3\frac{1}{2}$ mm. ; altitude, 3 mm.

Habitat—Norway ; Maine. One ♀ from S. Henshaw.

SOME NOTES ON BRUCHUS IN NEW MEXICO.

BY C. H. TYLER TOWNSEND, BROWNSVILLE, TEXAS.

A number of the bur-like fruits of *Glycyrrhiza lepidota*, a species of licorice native to Arizona and parts of New Mexico, were collected in the Mesilla Valley of the Rio Grande River, north of Las Cruces, in the fall of 1892. The following May, there were found issued from these burs many specimens of a Bruchid, which was identified at the Agricultural Department in Washington as *Bruchus alboscuteellatus*, Horn. There were also many parasites issued, which were determined by Mr. Ashmead as *Bruchophagus mexicanus*, Ashm. I am indebted to Mr. Coville for the determination of the plant.

Many pods of the tornillo or screw-bean, *Prosopis pubescens*, were also collected in the fall of 1892, at Las Cruces. In the following May, there were found issued from these many specimens of *Bruchus amicus*, Horn. Two parasites of this species were also bred with it, and have been determined by Mr. Ashmead as *Eupelmus cyaniceps*, Ashm., and *Holcopelte producta*, Ashm.

From a pod of *Lotus* sp., collected by Professor Wooton, near Las Cruces, there issued specimens of *Bruchophagus mexicanus*, Ashm., so determined by Mr. Ashmead. This further indicates that the pods of this *Lotus* sp. are affected by a *Bruchus* sp., in the Mesilla Valley region.

PREPARATORY STAGES OF ALYPIA LANGTONII, COUPER.

BY HARRISON G. DYAR, PH. D., NEW YORK.

This larva is a close ally of *A. octomaculata*, but differs from it in the pale head, the black bands broken in the subdorsal region, the small size of the subventral white spots and the absence of the conical tubercles which are represented by black spots. The food plant is the fireweed (*Epilobium angustifolium*).

Egg.—Laid singly on the under side of a leaf close to the projecting midrib. Flat at base, low conoidal, a little pointed at apex; micropyle depressed, surrounded by two concentric rings, granular-reticulate; from the outer ring a series of round-beaded ridges run to the under surface. These ridges under a Zeiss C objective appear as a series of rounded granules, but they alternate on successive ones so that the grooves between them are wavy as usual in the Noctuidæ. Micropyle a circular cup-shaped area of one circle of cells radiating from its centre, its edge forming the first ring. From this the ridges pass gently over the outer ring, becoming more distinct and increasing in number by the interpolation of others, confluent in pairs, but not marked on account of their granular structure. Diameter, 0.55 mm.; height, 0.3 mm. Colour whitish, not shining, marked with dark red-brown in an irregular blotched ring or broken spots, different in each egg. Duration of the stage, 9 days.

First Stage.—After hatching the larvæ walk with a looping gait, but soon begin to feed. They readily fall off by a thread when disturbed. Head bilobed, pale brown; width, 0.4 mm. Body yellowish-whitish, cervical shield, anal and leg plates blackish. Tubercles normal, brown, mostly minute, but those on joints 5-7 and 11 surrounded by large spots, those on joint 12 with small spots. Thoracic feet dark. Joint 12 enlarged, tubercles i. and ii. forming a square on it. Tubercle vi. absent, three setæ on the leg plates.

Second Stage.—At first as before; width of head, 0.5 mm. Body more brown spotted. Setæ fine, pointed, tubercles black, the subprimaries (iii. and v. on thorax and vi. on abdomen) present. Anterior two pair of abdominal feet a little smaller than the others. Later the tubercles are black, conic, irregular in size, the brown marks around them slight. The body appears green from the contained food. A dorsal line of irregular opaque white shadings.

Third Stage.—Large, black, conical tubercles with pale setæ. Body greenish, blotched with opaque white, especially dorsally; a few brown

markings as in the previous stage. Feet black. Head whitish, its tubercles all shining black, a little brown shading around mouth and eye. Width, 0.7 mm. Joints 4-7 and 12 form two humps in the position of rest of the larva.

Fourth Stage.—Head white, the black spots as before supplemented by many small dusky spots. The black tubercles form three transverse rows; a black dentate line above mouth. Width, 1.15 mm. Body white, tinged with orange on joints 5, 6 and 12 dorsally and along the region of tubercle iv. the whole length. Tubercles large, conical, black; hairs all pale, rather stiff, long, single. The body is mottled with brownish-black in irregular streaks between the tubercles, except subdorsally where the white ground prevails. Rims of spiracles, thoracic feet and leg plates, black.

Fifth Stage.—Head white with many black spots, all the spots of the preceding stage being now equally black. Width, 1.6 mm. Body as before, but the tubercles and narrow irregular marks velvety black. The orange shades spread, tending to form transverse bands; on joints 5, 6, 11 and 12 the faint orange bands are complete. The black marks are thickest ventrally, predominating, thin subdorsally; along dorsal line they form a series of irregular marks enclosing a broken white dorsal line. On the subventral folds the ground colour forms a series of white patches most distinct on joints 11-12.

Sixth Stage.—Head white with many black spots of various shapes; mouth parts black. Width, 2.3 mm. Body white, the segments banded with orange, obscurely except on joints 5, 6 and 12. Tubercles large, velvety black, low conic or almost flat, not produced. The velvety black marks on the body form narrow irregularly eroded and broken transverse lines, some only represented by angular marks, all broken subdorsally so as to give the appearance of a white subdorsal band. The lines are about eight on each segment, but so broken and irregular that they are difficult to trace. Dorsally they are partly confluent, forming branching marks irregularly X or Y-shaped. On the subventral folds the ground colour appears as a series of white patches, the largest situated between joints 11 and 12. Feet black, venter dark. Hairs long, distinct, rather stiff, white, all single and perfectly normal in arrangement for the Noctuid (*Agrotina*, Grote). The larva rests with joints 5-6 and 12 hunched up, forming two humps. Larvæ from Jefferson, N. H.

RELATIONSHIP OF THE FAUNA OF PUGET SOUND TO
THAT OF MEXICO AND CANADA.

BY WILLIAM HAMPTON PATTON, HARTFORD, CONN.

The fauna of Puget Sound [as shown by a collection of fifty species of Hymenoptera from Seattle, Washington, kindly sent me by Prof. O. B. Johnson, of the University of Washington] is most like that of Canada, no genera differing.

Sphex *Luca*, Sauss, and *Astata montana*, Cress., are interesting exceptions.

Sphex *Luca*, Sauss, shows relationship to California and Lower California. Originally described from Cape Saint Lucas, Mexico. I have identified it among specimens from Lake Co., Calif., kindly sent me by Mr. Oscar T. Baron, and it is found among the species from Seattle, collected by Prof. Johnson.

Astata montana, Cress. (Syn. *Ast. elegans*, Cress., ♂ ♀; Syn. *Ast. bella*, Cress., ♂;—the three names belong to one variable species), shows a relationship to the Plateaux Region; occurring at Guanajuato, Mex., on the Mexican Tableland, where it has been collected by Dr. Duges, as identified from a female specimen presented by me to the U. S. N. M., and occurring throughout the Western United States, extending east to the Plains.

SPHINX CANADENSIS, BOISDUVAL.

Prof. C. H. Fernald says in his Sphingidæ of New England: "This very rare moth was taken at flowers in Bangor, Maine, early in July, by Prof. Carl Brown, who kindly loaned me specimens for study." I have pleasure in announcing that this rare Sphinx has been added to the Society's collection, by Mr. C. G. Anderson, who, by industrious attention to bait and electric light, has accumulated a surprising amount and diversity of good material during the first part of the season.

This is the first report of *S. Canadensis* being taken in Ontario, that I am aware of. Mr. Grote refers to it as a Northerly species; and gives its habitat as Canada, Newfoundland, Maine. Rev. T. W. Fyles and Mr. Strecker have reported it from Quebec Province, but Mr. Strecker afterwards received a specimen that was taken near Cincinnati. Nothing as yet seems to be known of its early stages or food plants. Mr. Strecker's excellent coloured illustration of it in his *Rhopaloceres* and *Heteroceres* Plate XIII., fig. 13, is unmistakable, whilst his description, page 106, under the name of *S. Plota*, supplemented by that of Prof. Fernald, leaves nothing further to be desired in that direction. Mr. Anderson has also taken what appears to be a black form of *S. Gordius*.

J. ALSTON MOFFAT, London, Ont.

NEW TENTHREDINIDÆ.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

Periclista, Knw.—This name was proposed by Knownow in his monograph of the European Blenocampids, published in the "Winer Ent. Zeit.," V. 1886, 186, for those species having the lanceolate cell petiolate, the eyes more or less remote from the bases of the mandibles, and the posterior wings with the outer cells closed by a marginal vein. This name had already been used by Forester, 1869, for a genus of Cynipidæ, and I therefore propose the name *Mogerus* (μογερός) to take its place.

Blennocampa bipartita, Cress.—From an examination of a type specimen of this species, received from the American Entomological Society, I find that this species should be referred to the genus *Mogerus*.

Mogerus emarginatus, n. sp. ♂.—Black, with the following parts luteous: the labrum, the femora, the tibiæ, the base of the tarsi, and the apex of the first, second, third and fourth abdominal segments indistinctly so; the collar and the tegulæ, white; the clypeus, angularly emarginate; the antennæ, thickened at base, especially the third and the fourth segments, the third segments about one-fourth longer than the fourth; the wings hyaline; the veins brown; the costa and the stigma luteous; the anterior ocellus in a basin which connects with a transverse sinus which is caudad of the posterior ocelli. Length, 6 mm.

Habitat—Boston, Massachusetts. One specimen. This is the species and specimen referred to by Mr. Harrison G. Dyar in the CAN. ENT., XXVI., 1894, 185, as *Blennocampa bipartita*, where a description of the larvæ has been published.

Selandria floridana, n. sp. ♂.—Black, with the following parts yellow: the clypeus (the labrum is fuscous), the tegulæ, a line on the collar, a spot on the mesopleuræ, the legs, including the coxæ, except the middle and posterior tarsi, the caudal margin of the ventral abdominal segments, and the entire apical segment; the clypeus truncate; the labrum rounded; the antennæ slightly thickened in the middle, the third segments one-third longer than the fourth; the wings blackish-fuscous, paler at apex; the veins, including the costa and the stigma, black; the body shining, impunctured; the lanceolate cell without a cross-vein, open at the shoulder; the posterior wings with two middle cells. Length, 4.5 mm.

Habitat—Ormond, Florida.

A single specimen received from Mrs. Annie Trumbull Slosson. Readily separated from the described American species by the colour of the pleuræ.

Tenthredo bilineatus, n. sp. ♀.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a spot on the front beneath the antennæ, an ovate spot on the antennal ridges above the base of each antenna, the lower half of the cheeks, an elongate mark on the inner margin of the eye (this mark is half as long as the inner margin of the eye, reaching the meso-caudal angles of the eye, obliquely truncated in front, roundly emarginate on its mesal side, extending slightly beyond the caudal margin of the eye, a fine spur extending from the middle of its caudal margin to an elongate, quadrangular spot along the latero-caudal margin of the head, sub-interrupted from the mark on the cheeks, not extending mesad beyond the mesal margin of the spot or the inner margin of the eye), a small spot on the vertex, in a line with the spots on the latero-caudal margin of the head and caudad of the ocelli, the tegulæ, the collar, two lines on the mesonotum, converging behind, a broad line from the scutellum to the base of the anterior wings, the cenchri, a small triangular spot on the cephalo-dorsal corner of the mesopleuræ, a spot above the posterior coxæ, the basal membrane, two large spots on the sides of the basal plates, the trochanters, the bases of the femora, the front tibiæ and tarsi, and the middle tibiæ slightly beneath; the following parts rufous: the first segments of the antennæ entirely and the second and third on the inner side, the front and middle femora, the tibiæ above, the posterior femora beneath at apex, the posterior tibiæ, the middle and posterior tarsi, the venter, a narrow margin to the tergal segments one to three, and the tergal segments beyond the third; the third segments of the antennæ one-third longer than the fourth; the clypeus emarginate; the wings hyaline, slightly yellowish; the veins black; the costa and the base of the stigma luteous. Length. 6 mm.

Habitat—Ithaca, New York.

This species will be readily recognized by the markings on the head and mesonotum and the colour of the basal segments of the antennæ and the apex of the abdomen.

Tenthredo pallipunctus, n. sp. ♀.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, the lower part of the cheeks, a line on the collar, a spot above the posterior

coxæ, the anterior legs, including the coxæ, beneath, and the middle tibiæ beneath (the middle femora have blotches of yellow beneath, so that specimens will probably be found having the femora yellow beneath); the third segments of the antennæ one-third longer than the fourth; the clypeus emarginate; the wings hyaline, slightly fuscous; the veins, including the costa and the stigma, brownish. Length, 11 mm.

Habitat—Colorado. Mr. Carl F. Barker, collector.

This species is related to *flavomarginis*, from which it differs in having the tegulæ and basal plates black.

Tenthredo rufostigmus, n. sp. ♂.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, the lower half of the cheeks, the tegulæ, an abbreviated line on the caudal part of the pleuræ, a spot above the posterior coxæ, the front and middle coxæ except above, the posterior coxæ at side, the front legs, beyond the coxæ, beneath, and the middle trochanters and femora beneath; the following parts rufous: the middle tibiæ beneath, the middle tarsi, the posterior femora beneath, the posterior tibiæ and tarsi, and the abdomen, including the venter, beyond the basal plates except a spot on the base of the first tergal segment; the third segments of the antennæ one-fourth longer than the fourth; the clypeus squarely emarginate; the wings slightly infuscated; veins black; the costa and the stigma rufous. Length, 10 mm.

Habitat—Craig's Mt., Idaho. Prof. J. M. Aldrich, collector.

This species is related to *discrepans*, from which it differs in having the posterior femora rufous with a black line above.

Tenthredo atravenus, n. sp. ♂.—Black, with the following parts rufous: the legs beyond the trochanters except a spot on the bases of the femora above (the posterior tarsi are yellowish), the apex of the second abdominal segment, the third, fourth, and fifth abdominal segments entirely, and the base of the sixth abdominal segment; the third segments of the antennæ one-half longer than the fourth, the clypeus truncate; the labrum rounded, yellowish-fuscous at sides; the wings slightly clouded, more pronounced on the apical half; the veins black; the costa rufous; the stigma yellow, fuscous at base. Length, 10 mm.

Habitat—Juliaetta, Idaho. Prof. J. M. Aldrich, collector.

This species is related to *sectilis*, from which it differs in having no pale spot above the posterior coxæ.

Tenthredo terminatus, n. sp. ♀.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a spot on

the cheeks, the tegulæ, the latero-dorsal angles of the pronotum, a spot above the posterior coxæ, a spot on the sides of the basal plates, a fine line on the apical margin of the basal plates and the first and second abdominal segments, the front and middle legs, including the coxæ, beneath, the extreme apices of the posterior coxæ, and the posterior trochanters beneath; the following parts rufous: the posterior legs beneath beyond the trochanters, the tergal segments beyond the second, the sides of the third and fourth abdominal segments, and the ventral segments beyond the fifth, including the guides of the ovipositor; the clypeus squarely emarginate; the third segments of the antennæ one-third longer than the fourth; the wings subinfuscated; the costa and the base of the stigma rufous; the veins black. Length, 12 mm.

Habitat—Colorado. Mr. Carl F. Barker, collector.

This species is related to *nigricoxus* and *bella*; from the former it differs in not having the pale spot above the posterior coxæ wanting, and from the latter in having a black line above on all the legs.

Tenthredo æqualis, n. sp. ♀.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a spot on the cheeks, the tegulæ, a line on the collar, a spot above the posterior coxæ, the anterior tibiæ beneath (the anterior femora are paler beneath; probably specimens will be found in which they are yellow beneath), and the anterior tarsi; the following parts rufous: the femora, the middle and posterior tibiæ and tarsi (the anterior tibiæ have a fine black line above), a spot on the middle of the second and third tergal segments, larger on the third, the tergal segments beyond the third, and the ventral segments beyond the fifth except the ventral margin of the ovipositor; the clypeus squarely emarginate; the third segments of the antennæ twice the length of the fourth; the wings hyaline, the veins black; the costa and the stigma at base luteous. Length, 5 mm.

Habitat—Colorado. Mr. Carl F. Barker, collector.

This species is related to *lunatus* and *olivatifipes*; it differs from the former in having a pale spot above the posterior coxæ, and from the latter in having the scutellum black and the legs rufous.

Tenthredo ventricus, n. sp. ♂.—Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, the front beneath the antennæ, the cheeks, a fine line on the collar, a spot above the anterior coxæ, a spot above the posterior coxæ, and a spot on the sides of the basal plates; the following parts rufous: a fine line on the

inner margins of the eyes, the tegulæ, the prosternum, the mesosternum, and the mesopleuræ, the legs, including the coxæ, except a black line on the coxæ and trochanters and femora above (the front and the middle legs are somewhat yellowish beneath), and the abdomen beyond the middle of the first segment; the clypeus squarely emarginate; the third segments of the antennæ one-third longer than the fourth; the wings hyaline; the veins brownish; the costa and the stigma luteous. Length, 11 mm.

Habitat—Colorado. Mr. Carl F. Baker, collector.

This species is related to *rubelloides* and *hyalinus*; it is separated from the former by having the tibiæ entirely pale, and from the latter by the rufous mesopleuræ and mesosternum and the squarely emarginate clypeus.

Macrophya pulchella alba, n. var. ♀.—Black, with the following parts yellowish-white: the clypeus, the labrum, the mandibles except at apex, a triangular spot on the collar, the tegulæ, a circular spot on the pleuræ, the basal plates, the scutellum, the postscutellum, the front and middle legs, including the coxæ, except a ring on the apex of the tibiæ and the apices of the apical segments of the tarsi, the posterior coxæ and trochanters, the basal half of the posterior femora, and the tibiæ except a ring at the base and apex. Length, 8 mm.

Habitat — Indiana (Baker), Pennsylvania and Illinois (Nason), and New York.

Macrophya punctata, n. sp. ♀.—Black, with the following parts white: the clypeus, the labrum, a spot on the bases of the mandibles, two spots on the caudal margin of the vertex, a narrow line on the collar, the tegulæ at base, the anterior coxæ beneath, the apices and a line on the side of the middle coxæ, a large spot on the sides of the posterior coxæ, the trochanters, the front femora, tibiæ, and tarsi beneath (the apices of the segments of the tarsi are ringed with black), the apical half of the middle femora beneath, the middle tibiæ beneath, a ring on the middle of the posterior tibiæ, the middle and posterior tarsi except the apices of the segments, and two spots on the apex of the basal plates at middle; the clypeus broadly and roundly emarginate; the third segment of the antennæ twice the length of the fourth; the wings slightly infuscated; the veins, including the costa and stigma, black. Length, 10 mm.

Habitat — Plattsburg, New York. Mr. H. G. Dyar, collector

This species is related to *lineata*, from which it is separated by the colour of the posterior femora.

Macrophya minuta, n. sp. ♂.—Black, with the following parts white: the labrum, the mandibles except at apex, the outer margins of the tegulæ, the cenchri, the front and middle coxæ at apex, the posterior coxæ at apex and an ovate spot at side, the trochanters, the front and middle femora and tibiæ beneath, the front and middle tarsi except fuscous rings on the apices of the segments, and a narrow ring on the base of the posterior femora; the clypeus broadly emarginate; the labrum angularly emarginate; the head and thorax coarsely punctate; the third segments of the antennæ about one-fourth longer than the fourth; the wings hyaline; the veins black; the stigma, except its front margin, blackish rufous; the lanceolate cell contracted at middle. Length, 6.5 mm.

Habitat—Plattsburg, New York. Mr. H. G. Dyar, collector.

OENECTRA FLAVIBASANA, FERN.

On the 20th of June, 1895, Mr. Balkwill brought to me some Tortricid moths which he found at rest upon honeysuckle in his garden. They were new to me. He asked if I wanted any more? I said I would take all he liked to bring of that kind; so by the 27th I had got about three dozen of them. Being desirous of learning something about them, I applied to Prof. C. H. Fernald for information, and sent some of the moths. He replied: "They are *Oenectra flavibasana*, Fern. That he had two specimens in his collection; the types: one from Texas and one from Illinois. That nothing is known of their early stages or food plants, and would be glad to have published all that was known on these points." Up to the present time I can give nothing with certainty upon these points. Presumably, the larvæ had fed upon the honeysuckle, as chrysalids were found in the connate leaves with a thin silken web spun over them, one of which I raised to the moth. There is plenty of evidence of feeding having been done upon the plant, but nothing positive as to what did it. A lookout is being kept upon the plants for the next brood.

The original description was published in the Transactions of the American Entomological Society, Vol. X., p. 69, 1882. I see by it that the types are females. I may mention that the males are decidedly smaller in size, and lighter in colour, as a rule; otherwise the sexes do not perceptibly differ.

J. ALSTON MOFFAT, London, Ont.

REVIEW OF A FEW MORE PROVANCHER TYPES
OF ICHNEUMONIDÆ.

G. C. DAVIS, AGRICULTURAL COLLEGE, MICHIGAN.

In making a study of the Provancher types of Ichneumonidæ while at Quebec a year ago last winter, the type of many of the more recent descriptions was not found in the collection. Since that time types of many of the Abbé's latest descriptions have been found to be with the ones who sent the material, and are not lost, as was at first feared. Mr. W. H. Harrington, of Ottawa, has quite a number of these types, and through his kindness and generosity I have been privileged to study the types in his possession. The following notes are the result of this review :

Ichneumon citrinus ♂ = *Hepiopelmus*, Wesm.—This would be an *Amblyteles* by Cresson's synopsis.

Amblyteles superbus = *Amblyteles suturalis*, Say.

Phaeogenes annulatipes = *Ichn. annulipes*, Cress.

Phaeogenes pinguis is a *Cryptus*. The ovipositor is almost as long as the abdomen.

Stilpnus deficiens = *Thersilochus*.—The abdomen is piceous, with segment 2 and the tip paler.

Phygadeuon marginatus = *Herpistomus*.

Phygadeuon longicornis = *Cryptus incertus*, Cress.—The metanotum has two transverse carinæ, the tegulæ are reddish-black, and the abdomen is tipped with a pale spot at the apex above.

Phygadeuon fusiformis = *Cryptus montivagus*.—The only difference is in the posterior tarsi, which are pale, but segments 2-4 are not yellowish as in typical *montivagus*. According to Provancher (See p. 408 of "Add. et Corrections") *Phygad. annulatus* = *fusiformis*, and so making it a synonym also.

Phygadeuon gracilicornis = *Herpistomus*.

Phygadeuon fraterculus = *Cryptus*.

Phygadeuon similis = *Cryptus soror*, Cress.—It is a typical *soror* except the white scutellum. It may become a variety.

Phygad. capitalis ♂.—Probably O K, but may prove to be a ♂ *Cryptus*. The petiole is narrow, gradually enlarged, almost straight, spiracles in or just back of the centre. Front with a large irregular tubercle just beneath the antennæ, apparently caused by an injury.

Cryptus pubescens, ♂, O K.

Cryptus segregatus, ♂, O K.—From the description of this species

and *perditus* one would be led to believe they were synonyms, but the two types are quite different. *Segregatus* may be known by the translucent, very narrow, lanceolate stigma, while the stigma of *perditus* is broad, triangular and opaque. The tegulæ are white in *segregatus*, black in *perditus*.

Cryptus perditus has only one wing remaining, but is apparently a Hemiteles.

Cryptus mellipes = *Cryptus alacris*, Cress.

Cryptus sordidus = *Cryptus extrematus*, Cress.

Cryptus longicaudus, O K.—The tegulæ are black instead of white.

Cryptus ignotus, O K.

Cryptus pentagonalis, ♂ and ♀ O K.

Hemiteles gigas = *Platylabus*.

Hemiteles declivus, O K.

Hemiteles aciculatus, O K.—The description of colour markings is faulty. The nervures and stigma are brown; the posterior coxæ with the basal joint of the trochanters are black; the extremity of the tibiæ and tarsi is dusky; abdominal segments 3 and 4, except at the sides, with a part of 5, and 2 at the apex, red.

Hemiteles debilis, O K.

Mesostenus armatus, O K.—The areolet being open behind would place it in Foerster's genus *Otacustes*. There are some of Mr. Cresson's species that also belong here.

Mesostenus latigaster = *Tryphon*.

Mesostenus pluricinctus is not a *Mesostenus*. The oblique, slightly petiolate areolet would lead one to place the specimen with the Tryphoninæ, but the long ovipositor, curved petiole and general form place it nearer the Cryptinæ, where Provancher placed it. By the lunulæ, Foerster would place the specimen in his Phygadeuonidæ, and by the spiracles being in the middle of the petiole, it would belong to his genus *Diacritus*. Provancher's description of the species is not very complete. Points that might be added, besides those given above, are: Lower edge of clypeus, a small dot at the base of each antenna beneath, and a line beneath the primary wings, yellowish-white; a short, transverse median ridge on posterior part of metanotum; ovipositor nearly as long as abdomen; posterior coxæ and trochanters as long as or longer than the femora; claws large; front tibial spurs large and curved. The longitudinal carinæ on the metanotum, of which Prov. speaks, are so very

indistinct that they are hardly traceable. The species has evidently proved a stumbling-block to the Abbé in his work, as he has placed it in three different subfamilies, and each one under a new species. *Mesoleptus rufipes*, *Echthrus pediculatus* and the present species are one and the same. They are all, with very little doubt, synonyms of Cresson's *Mesoleptus* (?) *muliebris*, which is the ♂. The venation, form and markings are the same except that the ♂♂ are paler in colour.

Pezomachus sulcatus = *Pettitii*, Cress.—The sulcate groove of the mesonotum is perhaps a little deeper and plainer than in *Pettitii*, but is present in both, and the two species seem to be identical in all other respects.

Anomalon rufulum, ♀, O K.

Anomalon rufulum, ♂ = *Anomalon chlamidatum*, Prov.

Limneria Guignardi, O K.—Up to a very recent date I have supposed that this species was synonymous with *fugitiva*, Say. This seems to have been the general belief from the number of specimens in various collections under the name *fugitiva*. Say's description of *fugitiva* gives "posterior tibiæ white with black tip and base." Provancher's description of *Guignardi* reads: "The posterior (tibiæ) black with a large white annulus in the middle and another smaller at the base." I have found one typical *fugitiva*. *Guignardi* is the common species.

Thersilochus erebundus ♂ = *Porizon angulare*.

Mesoleptus angustus, ♂ and ♀, O K.

Mesoleptus rufomixtus, ♂, O K.

Mesoleptus nigricornis, ♀ = *Ctenopelma*.

Exenterus hullensis, ♂, O K.

Through the kindness of Mr. Guignard, I have been privileged to examine a few Provancher types in his collection. The following is a summary of this examination:—

Stilpnus appendiculatus = *Hemiteles humeralis* ♂.

Phygadeuon Guignardi = *Ichneumon mendax*, Cress.

Hemiteles mucronatus is O K.

Cryptus ornatus, O K.

Cryptus erythropygus, O K.

Cryptus 3-annulatus, O K.

Cryptus gracilis, O K.—*Cryptus rectus* answers the description of this species quite as well if not a little better. They are probably synonymous, though perhaps not.

Cryptus albonotatus, O. K.

Limneria Guignardi has already been spoken of in referring to the types in Mr. Harrington's collection.

Bassus dorsalis ♀ = *Hemiteles* ♂.—This is the true type and not the specimen in the Provancher collection referred to the genus *Plectiscus*.

Ephialtes variatipes is the ♂ of *Ephialtes macer*, Cress.

SYSTEMATIC VALUE OF THE LARVA OF SPERMOPHAGUS.

BY WM. HAMPTON PATTON, HARTFORD, CONN.

The seeds of *Gleditschia triacanthus* frequently show a narrow scar upon the surface. Rarely two of these scars are found upon the same seed. These scars are about one-eighth of an inch long; and indicate the presence of *Spermophagus gleditschiae*, a Bruchid beetle, of a mottled, tawny appearance, frequently bred from these seeds in the spring. The grub remains in the seed over winter, changes to pupa in the spring and soon emerges, as a perfect beetle, through a rounded hole in the side of the bean-seed.

The larva, observed by me in the middle of December, is an incurved Chrysomelaform grub, provided with three pairs of legs, as well developed as those of the larva of *Eupsalis* and *Anthrribus*. The thoracic segments are the thickest and the body tapers towards the apex. The head is partly sunken in the first segment. Along the sides the segments are slightly protuberant, and in other particulars an analogy to the larvæ of the typical Rhynchophora is shown; but the presence of thoracic legs proves the insect to belong to a different family of beetles. In the young larva the legs are probably long as in that of *Bruchus*. Mr. H. F. Wickham, in a paper published in 1894, describes the larva of *Spermophagus*.

Prof. J. O. Westwood, in Vol. I. of his "Introduction," states that the larva of *Bruchus* has minute legs. The larva of *Bruchus fabæ*, Riley, has been figured by Dr. Packard (Am. Nat., Sept., '73, p. 537, fig. 141) as a footless grub with a minute head. The larva of *Spermophagus* shows this to be an error, the head being of considerable size, and there being six legs. The mandibles were evidently mistaken for the head by Dr. Packard; and the head mistaken for the first segment. Mr. F. A. Marlatt (2nd Rep. Kansas Ex. Sta., p. 210) says the larva of *Bruchus obsoletus*, Say, is footless; but his figures, 2 and 3, on plate IX., give a better representation and show the legs.

NOTES ON A TRIP TO THE BAHAMA ISLANDS.

BY H. F. WICKHAM, IOWA CITY, IOWA.

Comparatively little is known of the insect fauna of the Bahama Islands, since most of the collectors who have gone to the West Indies have confined their attention chiefly to larger and better settled members of this great group, and as a consequence we have a tolerably fair knowledge of such of them as Cuba, Jamaica, Porto Rico, and Guadaloupe, with scarcely any records from the little rocky islets of which the Bahamas proper are composed. Late researches on the coast of Florida have shown a close affinity between the fauna of that region and of the Antilles, so that the study of the insects of the latter has now a direct bearing on that of those of our own domain. The short sketch which follows is intended merely as a preliminary account of a collecting trip to certain points in the British West Indies, and no more is hoped for than to give the reader a general idea of the coleopterous fauna of these at the time of year during which the collections were made. Only occasionally was it possible to land and work the country for insects, as the main object of the expedition, of which the writer was a member, was the study and collection of the marine invertebrata, and most of the time was necessarily devoted to them.

Regarding the general characters of the Bahama Islands, it may be enough to say that they are British possessions, having been first settled in 1629 by that people, but frequently changing hands until 1783; since that time they have remained under English control, and are populated largely by descendants of that nationality, with a very considerable admixture of negroes, who, indeed, predominate on some of the islands, almost to the exclusion of the whites. Excepting the very small rocky islets, all are inhabited, but the soil is so light and stony that its productive powers are limited, and hence we find the principal exports to be fruit, especially pineapples and cocoanuts. Aside from these, some of the larger islands export brazillito, yellow-wood, lignum-vitæ and fustic, and at one time cotton was an article of considerable commercial importance, but is now little grown. The citrus fruits flourish, but are apparently not exported to any great extent. The uncultivated portions of the surface, which include the greater part of the whole area, are covered in the main by tangled thickets of various shrubs and vines difficult of penetration, and hard to work in. Owing to the broken nature of the islands, farming can only be carried on in small patches and in the most primitive manner.

The geographical features are rather remarkable : the group forms an irregular triangle, the sides of which are about 720, 600 and 200 miles long. They lie within the influence of the trade winds, and inside the zone of hurricanes, which often do much damage, as the islands are mostly small and low, usually under 100 feet above tide level, the loftiest not over 400, while often they lie almost even with the water. In composition they are chiefly white sandstone or coral rock more or less disintegrated, often with sand beaches of dazzling whiteness. Situated on the edges of coral banks, often of a most dangerous character, and with so little of commercial attractiveness, we find most of the trade between the Bahamas and United States to consist of "fruiting," which is carried on in small schooners of from 150 to 200 tons burthen, plying chiefly between the island ports and Baltimore.

With this rather extended preliminary account, attention may now be directed towards the insect fauna. The first researches we made in this direction were on Egg Island, May 12th. This is a small wooded islet about a mile in length and 67 feet high ; on the topmost point is situated a lighthouse, while the beach along the harbour is adorned with an extensive cocoanut grove. Arriving about six o'clock in the evening, a short trip was made ashore, one of the objects in view being the capture of fire-flies, which could be seen flitting around in the thickets. Only one could be captured, however, and this proved to be a *Pyrophorus*, a genus of Elaterid beetle in which the light is emitted from two whitish spots, one on each side near the hind angles of the prothorax. This light is under the control of the insect to some extent, since two or three of the beetles that were knocked down became at once invisible, when they could certainly have been seen had the light continued. It was found later that in such cases the *Pyrophorus* could often be taken by carefully feeling in the dark for it—placing the palm of the hand flat on the ground over the spot where it was thought the specimen had fallen, and its presence would then be betrayed by its "snapping" in the manner of most elaters when pressure is applied.

Next morning another opportunity was afforded for going ashore, and by beating bushes over an umbrella a good number of additions were made to the collections of Coleoptera, though search along the beach and lagoons yielded no Cicindelidæ nor Carabidæ whatever. It is probable that they are rare on the island, as they seem, in fact, to be in most spots in the

Bahamas. A number of the Staphylinid, *Cafus bistriatus*, Er., were taken under sea-weed, in just such situations as they frequent along our southern Atlantic coast. On the bushes were found an *Olibrus*, a number of the widely-distributed *Coccinella sanguinea*, a little *Scymnus*, a curious Lathridiid which probably belongs to the genus *Monadus*, and a number of specimens of a very small *Corticaria*. A species of *Monocrepidius* was found occasionally, which looks like our *M. lividus*. A *Hemiptychus* obtained here agrees with Dr. Leconte's description of *H. similis*, which occurs in Florida, while another species of the same genus, together with *Catorama* and a *Petalium*, occurred occasionally. The Cerambycidæ were represented by *Eburia stigma*, Oliv. (*duvalii*, Chev.), an *Elaphidion* of small size and two species belonging to genera not yet identified. The Chrysomelidæ furnished species of *Cryptocephalus* and *Pachybrachys*, the former being represented most commonly by what seems to be *C. marginicollis* or a closely-allied form. Weevils were tolerably plentiful, especially an *Artipus*, which was everywhere in evidence; more rare were species of *Pachnaus* and *Conotrachelus*. *Lembodes solitarius*, Boh., a very curious weevil, found also in Florida, was beaten from herbage on the hill; it looks very little like a weevil, the posterior end being truncate and emarginate, while the pronotum is long, flattened, and extends quite over the head when the beetle is at rest. The prosternum is deeply excavated for the reception of the rather heavy beak, but the large legs seem not to be closely approximated to the body when the insect feigns death, but rather simply folded. The upper surface of the body is roughly sculptured and heavily scaled—a fringe of the latter around the anterior prothoracic margin giving that part a very strange appearance. The aspect of the beetle when shaken into a net is, on account of its grayish and brownish hues, irregular shape and sculpture, that of a small piece of dead twig, or a withered bud.

During the next week the vessel was cruising on the banks, and no land was touched. All this time, of course, nothing could be done in the line of Entomological work beyond keeping a lookout for such insects as might fly or be blown on the vessel. On the morning of May 18th, while lying some fifteen miles off Riding Rock, and after a heavy squall from that direction the night before, three moths were taken on the deck of the schooner, and also a specimen of *Cicindela tortuosa*. This was the first tiger-beetle our party saw in the Bahamas, though they were found in small numbers later on.

Water Cay, which is on the Salt Cay Bank, far to the westward of the main group of the Bahamas, was the next point at which we landed, and here a hard row of five miles was necessary to reach the shore. Only three hours were afforded for an examination of the place, and thus few insects were found. The main inhabitants were sea birds, which were excessively numerous, and bred in the crannies in the rocks, and hermit crabs (*Cenobita diogenes*), which occupy the places we are used to think of as belonging to the ground beetles. The rocky surface of the Cay, with its patches of coral sand and occasional hollow filled with black soil, was destitute of the wooded covering such as we saw on Egg Island, and diversified only by a few straggling bushes and herbs. A *Polycesta* was taken, however, which seems to be *velasco*, while an *Euphoria* has been referred with some doubt to *E. sepulchralis*, from my specimens of which it differs in the darker colour, with less metallic lustre, and more evident white markings, as well as in the somewhat coarser sculpture. The other genera that were recognized are: *Scymnus*, *Saprinus*, *Catorama*, *Cryptocephalus*, *Phaleria*, *Artipus* and *Dryotribus*; the last probably *D. mimeticus*, Horn, which has been taken in the Florida Keys.

For several weeks after leaving Water Cay nothing further was done in the Bahamas, the intervening time being spent in the vicinity of Cuba and Florida. Returning, we finally reached Harbor Island, near the northern end of Eleuthera, after a long run from Key West, and were promptly run fast on a sand-bar by a pilot. Landing on the morning of August 9th, the surface of the island was found to resemble that of Egg Island, which is in the immediate vicinity; the webs of two or three large showy spiders were common in the brush, while the song of invisible Cicadas ("singers," the Bahamans call them) filled the air on every side. Butterflies were more numerous than usual, but not being the especial object of search they were neglected for the sake of the favorite Coleoptera, since there was no time to carefully collect both. Turning, therefore, to the beetles, a little *Plochionus* was beaten from bushes as the sole representative of the Carabidæ. There were plenty of *Cafius bistriatus* on the beach under sea-weed, while of the Coccinellidæ there were beaten from bushes specimens of *C. sanguinea*, *Psyllobora nana*, and a little *Scymnus*. Several of the *Monocrepidius* mentioned as occurring on Egg Island were found here, also the Longhorn *Spalacopsis filum*, Klug. Of Chrysomelidæ there were not many—a Halticid and an Eumolpid being the most showy ones—and of Tenebrionidæ the most notable form was a

Phaleria allied to or identical with our *Phaleria longula*, but they were of a dark variety, black or brown above, with occasionally one showing a clay-coloured elytral border. *Anchonus* was found commonly under a drift log, this being the genus described from Southern Florida under the name *Gononotus*, Leconte. *Artipus* was extremely common in the brush, and may be found injurious in the Bahamas, as it has of late in Florida—its omnivorous habits rendering it a foe to many different plants.

It is only a few hours' run from Harbour Island to Spanish Wells, at the northern end of Eleuthera, so when some of the party came on deck next morning they were not surprised to find the vessel skimming along the rocky coast of that island, which, from its size and wooded surface, seemed to offer the most favourable conditions for collecting insects of any of the Bahamas that we had seen. About sixty miles in length, though very narrow, this island supports a larger population than most of its neighbours, and is said to be particularly adapted to the cultivation of the pineapple, while oranges, bananas and sapodillas are raised in some quantity. There are also large cocoanut groves on the beaches, the nuts being exported in greater or less numbers.

Here were found the first specimens of tiger-beetles that we had seen on the islands, two species, *Cicindela marginata* and *C. tortuosa*, being taken, the former the more commonly. It was rather too warm in the sunshine to make chasing them a particularly agreeable task, so a few examples were made to fill our wants. Of Carabidæ we took, or purchased, specimens of a *Scarites*, which, though probably *subterraneus*, is smaller than any of these that we have seen elsewhere, *Plochionus pallens* and *Apenes opaca*. The same Staphylinidæ and Coccinellidæ were captured as already given for Harbour Island, while in some of the succeeding families Eleuthera seemed much richer. A large *Pyrophorus* was common in the cocoanut groves, the lights gleaming for a moment and then disappearing in a way very provoking to one not familiar with the ground, and likely at any moment to run into a tree or fall over a log in the chase in the dark. The native children, however, were glad to catch them for us at the rate of a half-penny each, and in this way a good series was obtained with little trouble. The Buprestidæ were represented by *Acmaeodera cubæcola*, Duval, and *Gyascutus carolinensis*, Horn; the Ptinidæ by species of *Hemiptychus*, *Catorama* and *Sinoxylon*, while Longicorns were numerous in specimens, though not many species were

seen. Of these, *Elateropsis rugosus*, Gahan, seems worthy of special note, as it has been very rare in collections, and only since our taking it on Eleuthera has the exact habitat been known. In both sexes the upper surface is extremely roughly sculptured, forming rugosities on the disk of the thorax and elytra, and to a lesser degree on the head. The antennæ are brown or black, the legs reddish, but the sexes differ widely in the colour of the upper surface, which, in the males, is uniform brown or blackish, while in the females there is a broad stripe of white pubescence on the head, and three (one median, two lateral) on the prothorax, while the elytra have each a broad dorsal and narrow lateral stripe. In perfectly fresh examples the thorax has also an incomplete transverse basal band. A series of over forty specimens shows that the males vary in length from 16 to 32 mm., while the females run from 21 to 35 mm. A fine *Elaphidion* occurred on the island, also specimens of *Eburia stigma*, *Plectromerus dentipes*, and a *Cyllene*. An example of *Spalacopsis* I refer to *S. filum*, Klug, of which specimens are known from Porto Rico, Cuba, Haiti, and Florida. It is a curious insect, with a general resemblance to *Dorcasta cinerea*, and having the antennæ clothed with hairs in much the same manner, but the body is much more elongate, and when the beetle is beaten into a net it assumes a position of perfect rigidity, in which condition it can scarcely be distinguished from a bit of stick. Several Chrysomelidæ were obtained, all small and belonging chiefly to the Eumolpini and Halticini. Further, there are species of *Bruchus*, *Hymenorus*, *Oxaxis* and *Anthicus*, but as usual the chief development seems to be in the Rhynchophora, where the following genera have been thus far recognized: *Artipus*, *Pachnaeus*, *Anthonomus*, *Conotrachelus*, *Chalcodermus*, *Macrancylus* and *Dryotribus*. There are also several which are yet unknown, and may remain so for some time, since the Coleopterous fauna of these little islands has received no particular attention, and has formed the subject of no special memoirs. It is hoped, however, that the labours of the British West Indian Committee will result in the publication of a long series of papers similar to those lately published through their instrumentality, and in the clearing up of the questions surrounding the affinities and origin of the fauna of this group, which has evidently a close relationship with some portions of our own.

LIST OF LEPIDOPTERA TAKEN AT SUDBURY, ONT.

BY JOHN D. EVANS, TRENTON.

This list embraces all the species of diurnals captured, viz., 51, and those of the nocturnals, 125, but of the latter possibly as many more are as yet undetermined. To Mr. Jas. Fletcher for the butterflies, and Mr. J. B. Smith and Rev. Geo. D. Hulst for the nocturnals, I am indebted for their kindness in making determinations; to the first named I am also deeply grateful for many kindnesses extended at various times and for counsel and advice.

Among the diurnals special mention may be made of *Erebia discoidalis*, Kirby. Upon one occasion only (12th May, 1889) has this species been captured in this district, when the writer took five specimens, 4 ♂'s and 1 ♀, all in good condition, and Dr. Peters, at the same time and place, took two or three specimens, but the sexes were not ascertained.

During the season of 1886, *Colias interior* was quite common and *C. philodice* very rare, but in subsequent seasons the latter became the more numerous and the former very scarce :—

Danaus Archippus, <i>F.</i>	Pyrameis Cardui, <i>L.</i>
Argynnis Cybele, <i>F.</i>	Limnitis Arthemis, <i>Dru.</i>
" Aphrodite, <i>F.</i>	Debis Portlandia, <i>F.</i>
" Cipris, <i>Edw.</i>	Neonympha Canthus, <i>Bd.-Lec.</i>
" Atlantis, <i>Edw.</i>	" Eurytris, <i>F.</i>
" Myrina, <i>Cram.</i>	Erebia Discoidalis, <i>Kirby</i> ,
" Bellona, <i>F.</i>	Satyrus Alope, <i>F.</i> , form Nephelē,
Melitæa Harrisii, <i>Scud.</i>	<i>Kirby</i> .
Phyciodes Nycteis, <i>Doub.-Hew.</i>	Thecla Humuli, <i>Harr.</i>
" Tharos, <i>Dru.</i>	" Calanus, <i>Hbn.</i>
Grapta Comma, <i>Har.</i> , form Dryas,	Feniseca Tarquinius, <i>F.</i>
<i>Edw.</i>	Chrysophanus Hypophlæas, <i>Bd.</i>
Grapta Faunus, <i>Edw.</i>	Lycæna Pseudargiolus, <i>Bd.-Lec.</i> ,
" Gracilis, <i>Gr.-Rob.</i>	form 1 Lucia, <i>Kirby</i> .
" Progne, <i>Cram.</i>	Lycæna Pseudargiolus, form 2 Mar-
" J. Album, <i>Bd.-Lec.</i>	ginata, <i>Edw.</i>
Vanessa Antiopa, <i>L.</i>	Lycæna Pseudargiolus, form 3
" Milberti, <i>Godt.</i>	Violacea, <i>Edw.</i>
Pyrameis Atalanta, <i>L.</i>	Lycæna Comyntas, <i>Gdt.</i>
" Huntera, <i>F.</i>	

- Pieris Napi*, *Esper.*, form *Oleracea-hiemalis*, *Harr.*
Colias Eurytheme, *Bd.*, form *Eriphyle*, *Edw.*
Colias Philodice, *Gdt.*
 " *Interior*, *Scud.*
Papilio Turnus, *L.*
Carterocephalus Mandan, *Edw.*
Pamphila Zabulon, *Bd.-Lec.*, var. *Hobomok*, *Harr.*
Pamphila Zabulon, *Bd.-Lec.*, form ♀ *Pocahontas*, *Scud.*
Pamphila Manitoba, *Scud.*
 " *Peckius*, *Kirby.*
 " *Mystic*, *Scud.*
 " *Cernes*, *Bd.-Lec.*
 " *Metacommet*, *Harr.*
Amblyscirtes Vialis, *Edw.*
Nisoniades Brizo, *Bd.-Lec.*
 " *Icelus*, *Lint.*
 " *Juvenalis*, *F.*
Eudamus Pylades, *Scud.*
Hemaris diffinis, *Bdv.*
 " *pelasgus*, *Cram.*
Deilephila Chamænerii, *Harr.*
Ampelophaga myron, *Cram.*
Sphinx Kalmiæ, *S. & A.*
 " *drupiferarum*, *S. & A.*
 " *chersis*, *Hbn.*
Ceratomia undulosa, *Walk.*
Triptogon modesta, *Harr.*
Smerinthus geminatus, *Say.*
 " *cerisyi*, *Kirby.*
Paonias excæcatus, *S. & A.*
Cressonia juglandis, *S. & A.*
Sesia—sp. ?
Ctenucha Virginica, *Charp.*
Alypia MacCullochii, *Kirby.*
Hypoprepia fucosa, *Hbn.*
Callimorpha Lecontei, *Bdv.*
Platarctia hyperborea, *Curt.*
Arctia parthenice, *Kirby.*
 " *virguncula*, *Kirby.*
 " *determinata*, *Neum.*
Pyrrharctia isabella, *S. & A.*
Phragmatobia rubricosa, *Harr.*
Spilosoma virginica, *Fabr.*
Hyphantria cunea, *Dru.*
Halisidota caryæ, *Harr.*
Ichthyura inclusa, *Hbn.*
 " *albosigma*, *Fitch.*
Gluphisia trilineata, *Pack.*
Lophopteryx elegans, *Strk.*
Pheosia rimosa, *Pack.*
Oedemasia badia, *Pack.*
Cerura occidentalis, *Lint.*
Actias luna, *Linn.*
Telea polyphemus, *Cram.*
Dryocampa alba, *Grt.*
Clisiocampa Americana, *Harr.*
Hepialus argenteomaculatus, *Harr.*
Thyatira scripta, *Gosse.*
Raphia frater, *Grt.*
Arsilonche henrici, *Grt.*
Acronycta innotata, *Gn.*
 " *dactylina*, *Grt.*
 " *distans*, *Grt.*
 " *sperata*, *Grt.*
 " *oblinita*, *S. & A.*
Rhynchagrotis placida, *Grt.*
Eueretagrotis perattenta, *Grt.*
Pachnobia salicarum, *Walk.*
Agrotis ypsilon, *Rott.*
Peridroma astricta, *Morr.*
Noctua plecta, *Linn.*
 " *C. nigrum*, *L.*

- Noctua clandestina*, *Harr.*
Feltia jaculifera, *Gn.*
Porosagrotis mimallonis, *Grt.*
Carneades messoria, *Harr.*
 " *ochrogaster*, *Gn.* var.
 " *obeliscoides*, *Gn.*
 " *divergens*, *Walk.*
Mamestra purpurissata, *Grt.*
 " *grandis*, *Bdv.*
 " *rosea*, *Harr.*
 " *cristifera*, *Walk.*
 " *adjuncta*, *Bdv.*
 " *legitima*, *Grt.*
 " *lorea*, *Guen.*
Hadena impulsu, *Gn.*
 " *sputatrix*, *Grt.*
 " *devastatrix*, *Bracc.*
 " *arctica*, *Bdv.*
Hillia vigilans, *Grt.*
Hyppa xylinoides, *Gn.*
Brotolomia iris, *Gn.*
Nephelodes minians, *Gn.*
Hydroecia nictitans, *Bkh.*
 " *nitela*, *Gn.*
Leucania albilinea, *Hbn.*
 " *adonea*, *Grt.*
 " *commoides*, *Gn.*
Caradrina miranda, *Grote.*
Orthodes cynica, *Gn.*
Taeniocampa oviduca, *Grt.*
Cosmia paleacea, *Esp.*
Scoliapteryx libatrix, *L.*
Calocampa nupera, *Lint.*
Plusia bimaculata, *Steph.*
 " *octoscripta*, *Sanb.*
 " *ampla*, *Walk.*
Erastria carneola, *Gn.*
Drasteria erechtea, *Cram.*
Syneda Alleni, *Grt.*
Catocala briseis, *Edw.*
 " *concumbens*, *Walk.*
 " *relicta*, *Walk.*
Catocala antinympha, *Hbn.*
Prochoerodes clemataria, *S. & A.*
 " *transversata*, *Dru.*
Metanema inatomaria, *Gn.*
Ennomos magnaria, *Hubn.*
Azelina hubnerata, *Gn.*
Endropia effectaria, *Walk.*
 " *bilinearia*, *Pack.*
 " *madusaria*, *Walk.*
Sicya macularia, *Harr.*
Angerona crocataria, *Fabr.*
Semiothisa enotata, *Gn.*
 " *granitata*, *Gn.*
Phasiane atrofasciata, *Pack.*
 " *trifasciata*, *Pack.*
Thamnonoma wauaria, *L.*
 " *evagaria*, *Hulst.*
Lozogramma defluata, *Walk.*
Orthofidonia exornata, *Walk.*
Caripeta latorata, *Walk.*
Dasyfidonia faxiniaria, *Minot.*
Hæmatopis grataria, *Fabr.*
Caterva catenaria, *Cram.*
Cleora semiclusaria, *Walk.*
Boarmia pampinaria, *Gn.*
 " *umbrosaria*, *Gn.* near var.
 " *larvaria*, *Gn.*
 " *crepuscularia*, *Tr.*
Tephrosia canadaria, *Gn.*
Baptia albovittata, *Gn.*
Lobophora montanata, *Fack.*
Petrophora testata, *L.*
 " *nubilata*, *Pack.*
Rheumaptera ruficillata, *Gn.*
 " *lacustrata*, *Gn.*
Hydriomene trifasciata, *Bork.*
Epirrita inclinata, *Walk.*
Plemyria fluviata, *Hbn.*
Phlyctænia tertialis, *Gn.*
Loxostege chortalis, *Grt.*
Scoparia centuriella, *S. V.*

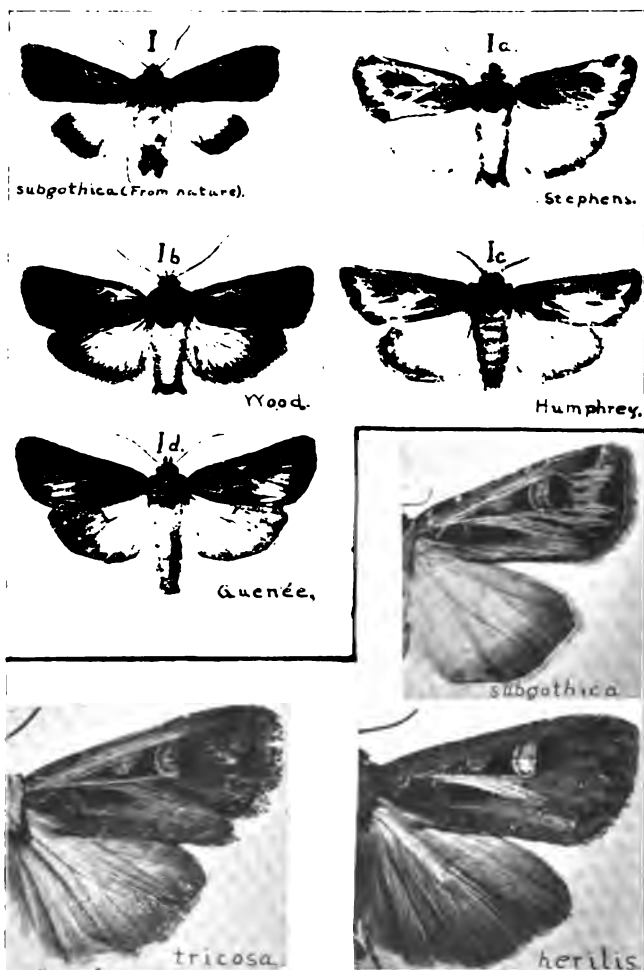
OBITUARY.

CHARLES W. STROMBERG died at his home in Galesburg, Ill., on Tuesday, March 26th, 1895, of consumption. He was in failing health for a number of years, and made a trip to Phoenix, Arizona, early in 1894, returning in November of that year, but did not find the relief he anticipated. His most grievous illness only preceded his death about a month. Mr. Stromberg was born in Sweden, July 24, 1856, and came to the United States with his parents in 1866. He was a resident of Galesburg up to the time of his death. He early became devoted to scientific studies, and for the past fifteen years has been a close student and collector in Entomology, making a specialty of Coleoptera, of which he had a most complete collection. He was exact and thorough in all his scientific work, as was recognized by his Entomological correspondents in both the United States and Canada, and in the neatness and care with which his exchanges were prepared. He was known, either personally or by correspondence, to all the prominent coleopterists in North America, and his field notes on his favourite families were always read with pleasure and interest.

Mr. Stromberg was quiet, reserved, and gentlemanly in his tastes and disposition, and was held in high esteem by all who knew him. His death, at a comparatively early age, is a serious loss to Entomology, as his genius for correct classification, his thorough observation and his deftness in handling would in the near future have placed him among the foremost workers in this branch of science. He was a welcome contributor to the leading Entomological journals, and an extensive collector for the Colleges of his State.

W. KNAUS, MacPherson, Kansas.

MR. C. H. TYLER TOWNSEND, temporary Field Agent of the Division of Entomology, U. S. Department of Agriculture, desires to inform his correspondents that he has again removed to Las Cruces, New Mexico.



AGROTIS SUBGOTHICA, TRICOLA AND HERILIS.

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FELTIA SUBGOTHICA, HAWORTH, OR AGROTIS (SUBGEN. AGRONOMA) JACULIFERA, GUENÉE, WHICH?

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

The latest statement of this case by the two recognized authorities, Mr. Grote and Prof. J. B. Smith, is as follows:

From "Bull. 44, U.S. Nat. Mus., p. 81 (1893)," by J. B. Smith,
Feltia subgothica, Haw.

jaculifera, var. Gn.

jaculifera, Gn.

tricosa, Lint.

From "List of N. Am. Europteridæ, * . * and Agrotidæ
p. 24 (1895)," by A. R. Grote.

Subgen. *Agronoma*.

Agrotis jaculifera, Gn.

subgothica, Auct. nec Haw.

tricosa, Lint.

jaculifera, Sm. in err.

jaculifera, var. A, Gn.

From 1873, when *jaculifera*, Gn. was first placed in the synonymy of *subgothica*, Haw. by Mr. Grote, until 1890, all American entomologists accepted the reference and did not use Guenée's name. In 1874, Dr. Lintner described Guenée's *jaculifera*, var. A, as a distinct species—*tricosa*, and correctly restricted Mr. Grote's *herilis* (described in 1873) to *jaculifera*, var. B, Gn. Prof. Smith's revision of the synonymy (Bull. 38, U.S. Nat. Mus., p. 111) was made in 1890, principally on the authority of Mr. Butler, who said the year before that "*tricosa*, Lint., is typical *jaculifera*; *herilis* is a poor variety." Mr. Grote bases his recent revision on the authority of Mr. Tutt, who stated (CAN. ENT., XXIII., 159 and 202): "I think there can be no doubt that Haworth's description applies to a well-known variety of *Agrotis tritici*."

An historical investigation which I made, a few years ago, of the names of the species of *Drasteria*, suggested that perhaps a similar critical study of the early literature of the insect under discussion might throw some light on the subject and enable one to arrive at an approximately correct synonymy. What little experience I have had in this line of work leads me to believe that there must be much similar critical study before the nomenclature of the moths reaches anywhere near the stability that Mr. Scudder's historical investigations have given to the nomenclature of the butterflies.

In 1810, Haworth described (Lep. Britt., p. 224) *subgothica* from a supposed English specimen; the sale catalogue of Haworth's collection published in 1834 indicates that he had but one specimen. As Haworth's work is very rare (I have not been able to get track of a single copy in this country), and as neither Mr. Grote (CAN. ENT., XXIII., 202) nor Prof. Smith (Bull. U. S. Nat. Mus., No. 44, p. 81) have ever seen the original description of *subgothica*, the following copy of it (obtained through the kindness of Mr. Champion, Librarian of Ent. Soc. of London) will be of interest and value:

"185. *subgothica*. (The Gothic Dart) alis griseo-fuscis, costa late at dimidiatim, stigmatibusque pallidis.

Habitat in Anglia valde infrequens. In Musæis tribus solum vide.

Expansio alarum. (Mr. Champion gives no figures.)

Descriptio. Præcedentibus (*sagittifera*) affinis absque punctis posticis sagittatis. Stigma anticum, subtriangulare, posticum reniforme: ante et inter hæc arcus niger qui reversus apparit in alis expansis. Stigma teliforme prægrande a basi fere ad medium, sed lineolis duabis divaricatum transversis interruptum. Posticæ pallidæ fimbria fusca."

No figure of the insect is given, and it is not definitely known if the single type specimen exists, thus much depends upon this description. Is there anything in it that does not apply to our American insect? Does it fit any known variety of the European *tritici* better?

Except in Stephens's Catalogue, *subgothica* seems not to again appear in the literature until 1829, when Stephens describes and figures (Ill. Brit. Ent., Haust., II., p. 126, pl. 22, fig. 3) an insect as *subgothica*, which he

says he obtained from a Mr. Raddon, who had evidently labelled it "near Barnstaple, Devon." A photographic copy of Stephens's figure is reproduced at *1a* on the plate. This figure is accepted by Mr. Grote (CAN. ENT., XXIII., 202) as that of *jaculifera*, Gn., but Prof. Smith doubts it (Bull. 44, U.S. Nat. Mus., p. 81). However, I think that a glance at the next figure of the insect that appeared, taken doubtless from Stephens's specimen, will remove all doubt as to what insect Stephens tried to represent. This figure, which is reproduced at *1b* on the plate [it is enlarged to natural size], is from Wood's Index Entomologicus, pl. 9, fig. 149 (1839). All must admit that it is one of the best figures of our American insect ever published. Although Wood does not state definitely that his figure was made from Stephens's specimen, we know he did thus make use of Stephens's collection for many of his figures, as he states in his preface. But one more figure of the insect seems to have appeared in English works. This one, by Humphrey (in Humphrey and Westwood's British Moths and their Trans., I., pl. xxiv., fig. 1, 1843), was recently referred to by Mr. Barrett (Ent. Month. Mag., XXV., 224) as being certainly a variety of *A. tritici*. The fact is, as Humphrey states, that his figure was copied from Stephens's figure; this was evidently not known to Mr. Barrett, as the context of his article indicates. Humphrey's figure is reproduced at *1c* on the plate.

Up to 1847, the English entomologists considered *subgothica* a British insect and a distinct species. Then, Mr. Doubleday stated (The Zoologist, V., 1728) that "Haworth's insect is evidently simply a variety of either *Agrotis tritici* or *aquilina*. The species described and figured by Stephens is American." For many years after this the name *subgothica* rarely appeared in British lists and only as a variety of *tritici*; it apparently does not occur at all in recent lists. It has never been taken in England, so far as I can find any record, since Stephens's time.

The name *subgothica*, Haw., was introduced into American literature by Dr. Fitch in 1856 (Second Rept. on Insects of N. Y., p. 546). It has been in universal use here since, and no American writer has seriously questioned the identity of our species with the *subgothica* of Stephens and later English writers, or even with the *subgothica* of Haworth, until 1891, when Mr. Grote changed his mind in accordance with the opinion of Mr. Tutt. I think that all now agree that the species under discussion is distinctly American. It undoubtedly has never occurred in England, notwithstanding the records of its English habitat by the earlier English

writers. Dr. Fitch suggested that the eggs or larvæ may have been accidentally carried to England, but Doubleday's explanation is doubtless the more correct one. He says (The Zoologist, V., 1729) : "I have traced all the specimens which I have seen of this species (the one described by Stephens) in collections of British Lepidoptera to one source, and I believe the gentleman who distributed them [Mr. Raddon is the gentleman referred to] inadvertently mixed a number of North American insects with his British ones. I received from him as *British* a Bombyx which my brother took in Florida; and Mr. Benjamin Standish possesses two Bombyces, one of them a Cerura, the other perhaps a Notodonta, from the same entomologist, which were sent to him as British, whereas both are well-known North American insects." There can be no doubt that several American insects found their way into the larger English collections formed in the beginning of the present century; and some of these, as Doubleday points out, were described by Haworth and Stephens as English insects. The evidence on this point is very conclusive as regards *Drasteria crassiuscula*, Haw.

Wood's figure (*rb* on the plate) and Doubleday's testimony are sufficient evidence, I think, that the *subgothica* of Stephens and later writers is our common American insect. But, is Haworth's *subgothica* the same as Stephens's? Probably Haworth's single type specimen could not now be found, if it exists at all. Without the specimen, we must depend on the original description and a little circumstantial evidence to settle this point. Haworth's specimen may easily be the one which Mr. Barrett recently found in an old English collection made up of specimens obtained from older collections by a Mr. Burney, who was contemporary with—and corresponded with—Haworth and others, and many of whose insects ultimately fell into his hands (Ent. Month. Mag., XXV., 223). Mr. Barrett says there was one specimen that proved to be really a type of *A. subgothica*, and the specimen was not a variety of *tritici*. Mr. Dale says (p. 246 of the same magazine) that this specimen "probably came from Mr. Raddon, the gentleman referred to by Mr. Doubleday" as having introduced several American insects into English collections; Stephens's figure was made from one of these specimens. Haworth's description seems to apply very well to our American insect, and it also affords a valuable bit of circumstantial evidence in the remark that he had seen the species in only three museums. It is hardly probable that one of these three col-

lections was not that of Stephens, then one of the few great English collections. Thus, I believe that the weight of evidence indicates that the *subgothica* of Haworth and Stephens were the same species.

But, curiously enough, while all American entomologists have claimed the name *subgothica*, Haw., for our insect, the English authors since Doubleday have claimed Haworth's insect as a variety of their *tritici*. Doubleday said it was "simply a variety of either *tritici* or *aquilina*," but it was soon restricted to the former in British lists, and it is still considered as such by Mr. Tutt. The evidence in support of this seems to be confined principally to the simple statement of Doubleday, although Tutt intimates that he has seen Haworth's description; but Tutt does not (CAN. ENT., XXIII., 159) know our American insect. I think the evidence produced to show that Haworth's *subgothica* is our American insect outweighs any opinion which English writers, who do not know our insect, may form from the original description alone.

The name *jaculifera*, which occupies so conspicuous a part in the synonymy of this insect, was proposed by Guenée, in 1852, for an American insect. His description of the species includes a good characterization of the type, followed by brief descriptions of two varieties, A and B. I think both Mr. Grote and Prof. Smith agree that Guenée's figure (reproduced at *rd* on the plate) and his description of the type of the species correspond to what American writers have been calling *subgothica*, Haw., for the past quarter of a century. *Jaculifera*, Gn., was first placed in the synonymy of *subgothica*, Haw., in 1873, by Mr. Grote, and on the same page he described both of Guenée's varieties, A and B, as a new species—*herilis*. In 1874, Dr. Lintner made a careful study of the forms included under Guenée's specific title *jaculifera*, with the result that Mr. Grote's *herilis* was restricted to *jaculifera*, var. B, Gn., and var. A was described as a new species—*triosa*.

No one has since questioned the specific rank of Guenée's varieties. Therefore, according to Canon XXVIII. of the A. O. U. Code of Nomenclature, the name *jaculifera* must be restricted to the first or main part of Guenée's description; this is the only portion of the description that can apply to his figure or to the insect under discussion. It is true, as Prof. Smith says (Bull. 38, U. S. Nat. Mus., p. 113): "Under all circumstances Guenée's name must stand for one of the forms, since he had all three before him," but in 1873 and 1874 the name was restricted to, or "was retained for that portion of the group to which it was first applied"

(to use the language of the Canon referred to) by Mr. Grote and Dr. Lintner. Therefore, I cannot understand how Guenée's name can be consistently applied to Dr. Lintner's *tricosa*, and it is not in accordance with the rule of nomenclature just cited. The fact that the form which agrees with the main part of Guenée's description and with his figure may or may not be a synonym of *subgothica*, Haw., does not affect the case in any way. I believe Mr. Grote is right in his protest (CAN. ENT., XXIII., 151) against the resuscitation of *jaculifera* at the expense of *tricosa*.

As has been stated, Prof. Smith's synonymy is founded principally on the statement of Mr. Butler that "*tricosa*, Lint., is typical *jaculifera*; *herilis* is a poor variety." The antennal differences between *herilis* and *tricosa*, pointed out by Prof. Smith, show that Mr. Butler did not study the species very carefully. The other point has been discussed by Mr. Grote as follows: "Guenée happens to figure typical *jaculifera* and he figures typical *subgothica*! Prof. Smith does not quote Guenée's illustration, which contradicts both Butler's statement and his own course. Guenée's types of '*jaculifera*,' or so-called 'types,' were several in number at least, as he included two other species as varieties. One of these so-called types Mr. Butler may have, and this may be a *tricosa*, Guenée's var. A. Guenée made three mistakes as to his material: First he described and figured *subgothica* as *jaculifera*; then he described specimens belonging to two different species, *tricosa* and *herilis*, as varieties of *jaculifera*. Under no circumstances can Butler's statement be correct (CAN. ENT. XXIII., 151)." The enlarged figures (twice natural size) of a front and hind wing of each of the three species just discussed show some of their differences and will aid in their determination. I believe the above evidence warrants the following synonymy for these much-discussed forms:

subgothica, Haw.

jaculifera, Gn. (type and figure).

tricosu, Lint.

jaculifera, var. A, Gn.

herilis, Grote.

jaculifera, var. B, Gn.,

or the same as that given by Dr. Lintner in detail in 1874 (Ent. Cont., III., 161), and accepted by Mr. Grote until recently.

Shall it be *Agrotis*, *Feltia*, or *Agronoma subgothica*, Haw.? Apparently Mr. Grote and some other systematists are not yet ready to

accept all of the new genera which Prof. Smith has recently proposed in his revision of the old genus *Agrotis*. While I am a thorough believer in the value of sexual characters in the classification of the Noctuids, I should hesitate to establish genera upon them without first examining other than our own fauna. In a recent study of the genus *Drasteria* I found that all of the known species in our fauna had decidedly asymmetrical male genitalia, while the species in the allied genera *Euclidia* and *Caenurgia* had not; nor had this peculiarity been noticed in any other Noctuids. Although none but American forms have been placed in *Drasteria*, I am sure that at least one of the common European Euclidias belongs to it, but I am not yet sure that this European species does not have symmetrical male genitalia.

While it is true that Walker insufficiently characterized his genus *Feltia*, yet the description of a species—*ducens*—made it a valid generic title; and as *ducens* is a synonym of *subgothica*, Prof. Smith had a right to recognize *Feltia*. But Mr. Grote now claims (in his List for 1895) that *Feltia* must fall as a synonym of Hübner's genus *Agronoma*. Hübner placed four European species in the genus, and Mr. Grote thinks the type species is *valligera* (*vestigialis*). Now, if it can be shown that *subgothica* is congeneric with the European *valligera*, and both Stephens and Guenée mention a resemblance, then Mr. Grote is right in placing *Feltia* in the synonymy. Mr. Grote gives *Agronoma* only subgeneric rank. I prefer to leave the discussion of this point to Messrs. Grote and Smith; it will require a more critical study and comparison of the American and European species than has yet been made before the question can be settled.

In the light of our present knowledge, I prefer to continue to use the name *Agrotis subgothica*, Haw., which has become so familiar to American entomologists from its frequent use in both our systematic and economic publications.

Agrotis muranula.

In his last revision of the Agrotids (Bull. 44, U. S. Nat. Mus., p. 85) Prof. Smith placed *muranula*, G. & R., in the synonymy of *vetusta*, Walk. This called forth the following protest from Mr. Grote under the above heading (CAN. ENT., XXVI., 81): "Two species, properly referred by me at the time to *Agrotis*, were described by Walker under the same specific name *vetusta*. One of these turns out to be, as I had suggested in my essay, *muranula*, G. & R., and this latter name, I claim,

under the custom and as accepted in Staudinger's catalogue, should be retained for the species it designates, since at the time it was free to be named and no subsequent generic separation can overturn its real and conceded right at the time it was proposed. *Vetusta*, Walk., as applied to *murænula*, must be relegated to the synonymy."

The facts are that Walker described *Mythimna vetusta* in 1856 and *Agrotis vetusta* in 1865; and Grote and Robinson described *Agrotis murænula* in 1868. In 1882, Mr. Grote stated that perhaps *Mythimna vetusta*, Wlk. (not both this species and *Agrotis vetusta*, as Prof. Smith states in Bull. 38, U. S. Nat. Mus., pp. 125 and 212), was *murænula*, and that it certainly was an *Agrotis*. Walker had thus unwittingly given two species of *Agrotis* the same specific name, and hence one was free to be renamed. But which one—the one described in 1856 as *Mythimna vetusta* or the *Agrotis vetusta* described in 1865? Mr. Grote evidently assumes that the former name must fall, but usage and consistency dictate that the older name should be retained. An examination of type specimens by Prof. Smith shows that *Mythimna vetusta*, Wlk., and *Agrotis murænula*, G. & R., are the same species. Then *murænula* must be placed in the synonymy of the older *vetusta*; and, Walker's *Agrotis vetusta*, if it proves to be a valid species, is free to be renamed, and must be renamed should it be congeneric with *Porosagrotis vetusta*, Wlk. Thus, I believe the facts warrant Prof. Smith's use of the name *vetusta*, Wlk., for *murænula*, G. & R. Mr. Grote seems to have omitted *Porosagrotis obesula*, Smith, from his List for 1895.

THE SECOND ANACRABRO, AND THE SMALLEST AMERICAN OXYBELUS.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Anacrabro boerhavia, n. sp. or var.—♂ about 7 mm. long; differs from *ocellatus* by the yellow markings, which are as follows:—Dorsum of prothorax and tubercles yellow, the tubercles with a black central dot. Mesothorax all black, except a small yellow spot on each side at hind border, adjacent to yellow spot of scutellum. Scutellum with a pair of large yellow spots. Postscutellum yellow. Inner side of anterior half of anterior femora yellow. Tibiæ yellow, with more or less black behind. Tarsi yellow, slightly tending to orange. Segments 1-6 of abdomen presenting a yellow spot medially, and a large yellow patch on each side. The median spot on first segment is round, that on 2-3

transversely oval, that on 4 transversely spindle shaped, that on 5 broad with truncate ends, that on 6 nearly square, but slightly constricted on each side. Lateral patches more or less bifid at their inner ends, and produced to a point below on lateral margin of abdomen. Strongly punctured, much more sparsely on pleura. Pubescence of face and cheeks silvery. Eyes very large, at least as near together on middle of face as the two upper ocelli are to one another.

Hab., Las Cruces, N. M., Aug. 23, 1895, on *Boerhavia*, believed to be *B. erecta*. The type is now in Coll. Am. Ent. Soc. Since this does not seem to differ structurally from *A. ocellatus*, Pack., the only species hitherto described, Mr. Fox suggests that it may be but a variety of it. The nearest known locality for true *ocellatus* is West Point, Nebraska.

The *Boerhavia* has sticky flower-stalks, which catch insects—for what purpose I do not know. *Harrisina coracina* is often seen dead on the stalks, caught by the sticky exudation.

Oxybelus cladothricis, n. sp.—♀ about 3 mm. long; rather shiny, especially the abdomen; with a strong lens the head and thorax appear to be minutely punctured; with a compound microscope the surface is seen to be minutely reticulated, and regularly and not densely punctured. Head large. Second joint of flagellum decidedly shorter than first, third a little shorter than second. Wings hyaline, nervures dark brown, marginal cell pointed at tip. Colour black, with the abdomen entirely red. Median hind border of prothorax broadly, tubercles, squama, tibiae except one side of posterior ones, and a large portion of anterior femora, white. Tarsi brownish or rufescent. Tegulae pale testaceous. Sides of face, cheeks, and pleura with glittering white pubescence. Spine minute, straight, obscurely notched at tip. Squama with the two sides united, the points terminal and curved inwards, the median notch rounded.

♂ a little smaller, abdomen narrower, and ornamented with glittering silvery pubescence, forming narrow bands at distal margins of segments. No lateral spines on abdomen. Squama broader, squarely notched in middle, the points more curved.

Hab., Las Cruces, N. M., early in Sept., 1895, on *Cladanthrax cryptantha*, the plant determined by Prof. Wooton.

This *Oxybelus* will be easily known by its small size, and red abdomen. The pointed marginal cell is also peculiar, as *4-notatus*, *cornutus*, *emarginatus*, *sparideus*, *aztecus*, and probably most of the genus have it narrowly truncate. It is pointed in *argenteopilosus*, judging from Cameron's figure, though nothing is said about the matter in the description.

BUTTERFLIES OF SOUTHERN MANITOBA.

BY E. F. HEATH, THE HERMITAGE, CARTWRIGHT, MAN.

The following is a list of Diurni taken in Southern Manitoba about Section 35, Township 2, Range 15, W. of the first principal meridian, near the Village of Cartwright, and collected at intervals during the last ten or twelve years :—

Papilio oregonia, Edw.—Only once seen, and taken three years ago—a rather worn specimen. Taken in July.

Papilio asterias, Fab.—General, but not very abundant.

Papilio turnus, Linn.—General, but not very abundant, except in '93, when it was rather numerous.

Papilio turnus, Linn.—Very dark ♀—very heavily banded ; appeared later than the ordinary form.

Pieris protodice, Bd.—Lec.—Common and abundant.

Pieris rapæ, Linn.—Occasionally.

Pieris napi oleracea, Esper.—Occasionally.

Nathalis iole, Bd.—One specimen only seen. Taken flying over some flowering annuals in garden, about end of July.

Colias eurytheme, var. *Eurytheme*.

Colias eurytheme, var. *Keewaydin*, with the albino form. } All very abundant.

Colias eurytheme, var. *Eriphyle*. } Ariadne seems to be absent.

Danais archippus, Fab.—Abundant throughout the summer.

Argynnis cybele, Fab.—Abundant. Occurs during July.

Argynnis cipris, Edw.—Occasionally in August.

Argynnis aphrodite, Fab.—Very rare, one only taken.

Argynnis lais, Edw.—Abundant. Occasionally in August.

Argynnis myrina, Cram.—Abundant. Occurs in the early spring.

Argynnis bellona, Fab.—Abundant. Occurs in the early spring.

Euptoieta claudia, Cram.—Occasionally and generally, during July and August.

Phyciodes nycteis, Doubl.—Hew.—Common. Of this I have taken one curious variety, in which the orange is replaced by white ; the specimens not being at all worn.

Phyciodes carlota, Reak.—Common

Phyciodes tharos, Dru.—Common.

Grapta interrogationis, Fab., var. *Fabricii*.—Occasionally. On wild hop, in August.

- Grapta interrogationis*, var. *umbrosa*.—Occasionally.
Grapta comma, Harr., var. *dryas*.—Rarely.
Grapta progne, Cram.—Not common.
Vanessa antiopa, Linn.—Abundant in the latter end of summer.
Vanessa californica, Bd.—Two specimens taken. Not seen for some years.
Vanessa milberti, Godt.—Abundant.
Pyrameis atalanta, Linn.—Sometimes abundant.
Pyrameis huntera, Fab.—Some years ago, I think in 1884, this insect was abundant, so much so that I only caught one or two specimens, thinking it would be equally general in other years. Since then I have only seen and taken one insect. Occurred in August.
Pyrameis cardui, Linn.—Common in some years, scarce in others.
Limenitis arthemis, Dru.—Common in June and July.
Limenitis disippus, Godt.—Occasionally in June and July.
Neonympha canthus, Bd.—Lec.—Locally and occasionally occurs latter end of June and July.
Coenonympha inornata, Edw.—Common.
Satyrus nephele, Kirby.—Very common.
Satyrus nephele, v. *Boopis*.—Very common.
Chionobas varuna, Edw.—One only seen and taken, and that a rather worn specimen, during August.
Thecla calanus, Hub.—Rare.
Thecla strigosa, Harr.—Abundant ; occurs in July.
Thecla augustus, Kirby.—Only one seen and taken during May.
Thecla titus, Fab.—Common during July.
Thecla.—Not identified; appears to be a new species. Only one seen and taken some years ago.
Chrysophanus helloides, Bd.—Lec.—Abundant in June and July.
Lycæna sæpiolus, Bd.—Only two specimens taken at the end of June.
Lycæna Couperii, Grote—Common in May.
Lycæna pseudargiolus, v. *neglecta*, Edw.—Common in June.
Lycæna pseudargiolus, v. *lucia*, Edw.—Rare
Lycæna melissa, Edw.—Common in July.
Lycæna comyntas, Godt.—Rarely seen.
Lycæna amyntula, Bd.—Common during June and July.
Lycæna aquilo, Bd.—Only one seen and taken June 12th, 1894.
Carterocephalus mandan, Edw.—Local and not abundant, in July.

- Thymelicus garita*, Reak.—Occasionally.
Pamphila zabulon, Bd.—Lec.—Common in June.
Pamphila zabulon, v. *hobomok*.—Common in June.
Pamphila nevada, Scud.—One specimen taken. Occurs in August and September, when I have little opportunity for collecting.
Pamphila peckius, Kirby.—Common in June and July.
Pamphila mystic, Scud.—Occasionally in June and July.
Pamphila cernes, Bd.—Lec.—Occasionally in June and July.
Pamphila metacomet, Harr.—Occasionally in June and July.
Amblyscirtes vialis, Edw.—Occasionally in May.
Pyrgus tessellata, Scud.—Occasionally in July and August.
Nisoniades brizo, Bd.—Lec.—Fairly abundant in May.
Nisoniades icelus, Lint.—Fairly abundant in May.
Nisoniades juvenalis, Harr.—Occasionally in May.
Eudamus pylades, Sm.—Abb.—Occasionally in May and June.

The following are rough notes on the occurrence and capture of *Diurni*, etc., during 1894, about my farm in Manitoba:—

April 22nd—I first noticed hibernated specimens of *V. antiopa* and *V. milberti* flying about in the sunshine.

“ 26th—In the evening I took several *Noctuæ*, some apparently belonging to the genus *Tæniocampa*, and also a dark gray moth, flying about the breaking catkins of the white poplar. Also on several evenings subsequently.

May 18th—*Lycana Couperii* tolerably abundant, and *L. pseudargiolus-neglecta* just appearing.

“ 23rd—*L. Couperii*, *Nisoniades juvenalis*, *brizo* and *icelus* abundant on the flowers of the Bear-berry (*Arctostaphylos uva-ursi*). At the same time I took the only specimen of *Thecla augustus* I have yet seen. *Lycana amyntula* beginning to make its appearance.

“ 27th—First noticed *A. myrina*.

“ 28th—*Phyciodes carlota* and *Colias eurytheme* made their appearance.

“ 30th—*Papilio turnus*, several, but not nearly so numerous as in 1893.

“ 31st—I found on a small patch of prairie (on which a certain grass, the name of which I do not know, seemed abundant) several specimens of *Amblyscirtes vialis*, which I had not seen for several years. *Danais archippus* seen for the first time.

June 1st—*V. atalanta* and *Eudamus pylades* occurred.

" 7th—*Phyciodes tharos* and *Pamphila sabulon* taken.

" 9th—*Carterocephalus mandan* taken, and *Czonomypha inornata* generally during this month and July.

" 10th—*Limenitis arthemis* first appeared.

" 12th—A single specimen of *Lycæna aquilo* taken flying on the banks of the river with "*Amyntula*," etc.

Phyciodes nycteis abundant, and also "*Pratensis*."

" 13th—*Argynnis lais* and *Lycæna melissa* taken in July.

" 15th—*Chrysophanus epixanthe* flying over patches of knot-grass (*Polygonum aviculare*) and *Lycæna sæpiolus*.

" 21st—I saw a butterfly which I watched for some time, but was unfortunately unable to capture, which I have very little doubt was *Pyrgus centaurea*. I have never before seen anything like it.

July 3rd—*Thecla titus* abundant, and one or two *Limenitis disippus*.

" 6th—*Thecla strigosa*, *Pamphila metacomet* and *A. cybele* noticed.

" 7th—*Satyrus nephele*, *Euptoieta claudia* and *Neonympha canthus*. Early for *E. claudia*.

" 14th—*Papilio asterias* and *Vanessa antiopa*. After this date I was too much engaged in farm work to do much collecting, but I noticed far fewer insects than usual, attributable to the extremely hot, dry weather we had during the latter half of July and August. *P. protodice* much less abundant than usual, and also the later forms of *C. eurytheme*. A very few *V. atalanta* were seen, and I do not think I saw a single *V. cardui*, and certainly none of *V. huntera*. The genus *Grapta* was conspicuous by its absence, and *V. milberti* much less numerous than usual. Several times during August, while on either the mowing machine or the binder, I noticed a *Pamphila* rise suddenly in couples, some six or eight feet into the air from the grass, and fight for a few seconds, and then drop as rapidly, like stones, back into the grass. Needless to say I was unable to identify them, but I have taken "*mystic*" about that time, and also "*nevada*." I did not notice a single specimen of *P. tessellata* in 1894.

In addition to the above list, I watched for some time last summer, but unfortunately was unable to take, what I am almost certain was a specimen of *P. centaureæ*. One thing I have particularly noticed about collecting in Manitoba is the occurrence of single specimens of a genus from time to time; the most careful search in the locality of the capture failing to produce any more. The same, to a great extent, occurs with *Noctuæ*.

I must not omit to here publicly express my thanks to Mr. James Fletcher, of Ottawa, for the very kind assistance he has given me in identifying many of my species, and I am sure from the trouble I have given him, he will be more thankful than myself that the task is now ended.

NOTES ON MR. E. F. HEATH'S COLLECTION OF BUTTERFLIES.

BY JAMES FLETCHER, OTTAWA.

In August last, when visiting Mr. E. Firmstone Heath, of The Hermitage, near Cartwright, Man., I had an opportunity of examining his fine local collection of Lepidoptera, which consists of twelve cases of well-set and preserved butterflies and moths. Among the butterflies were some species, the occurrence of which in Southern Manitoba surprised me very much.

Mr. Heath's residence is situated in a beautiful wooded valley, and on the bank of a small winding river, the Indian name of which means the "Long River which runs crookedly." The trees on the banks of the valley, which is about a mile wide at The Hermitage, are chiefly scrub oaks (*Quercus macrocarpa*), ash-leaved maples, aspen and balsam poplar (white and black poplar of the settlers), Saskatoon (*Amelanchier alnifolia*), white thorn (*Crataegus coccinea*), wild plum, a few American elms, choke-cherry, and various willows. The locality is undoubtedly a rich one, presenting a great variety of natural habitat for insects. The general character of the country surrounding the valley is a rolling grassy prairie, here and there broken by farms, and bluffs of white poplar.

This picturesque spot is about ten miles north of the boundary of the State of North Dakota, and about twenty-five miles north-east of the Turtle Mountains.

The following species in Mr. Heath's collection struck me as being of particular interest :—

1. *Papilio oregonia*.—Precisely like specimens taken in the Okanagan Valley, British Columbia, which was the most eastern locality previously recorded in Canada, nearly one thousand miles due west. It may be noted that *Artemisia dracunculoides*, the food plant of *P. oregonia* in British Columbia, also grows wild on Mr. Heath's farm.

2. *Vanessa californica*.—The occurrence of this species in Manitoba is no less remarkable than that of the last. I do not think there is any previous Canadian record east of the Rocky Mountains.

3. *Nathalis iole*.—This is very far out of its previously known range.

4. *Chionobas varuna*.—Chiefly notable for the late date of capture, namely, August ; but the locality also is much farther east than previous records.

5. *Thecla strigosa*.—Of this species I have had scores sent to me for identification, from Ontario and Eastern Canada, during the last five or six years, and never saw but two specimens of the form showing the large fulvous patches on the primaries, which Mr. Scudder thinks was intended to be represented under the name "*T. liparops*" by Boisduval and Leconte. As far as I can remember, all of the Manitoban specimens of *T. strigosa* that I have seen (about 40 in number) show these fulvous blotches very distinctly, and the specimens are slightly but uniformly smaller than specimens from Ontario, etc. This would indicate, I think, that the Manitoban form is sufficiently distinct to be designated by a special name, and I suggest for it *T. strigosa*, var. *Liparops*. I have specimens from Cartwright, Winnipeg and Brandon.

6. *Thecla* —? Mr. Heath has one specimen of a very fine *Thecla*, quite unlike any described American species, of which I hope he will some day obtain further specimens for description.

7. *Lycana amyntula*.—This is the common tailed-blue, not only in Southern Manitoba, but at Winnipeg, and as far east, at any rate, as Nepigon, north of Lake Superior. The eggs are laid on the pedicels of the flowers of *Lathyrus ochroleucus*, in identically the same manner as is done by the same species in British Columbia, on the pedicels of the same species and of *Lathyrus venosus*.

SUPPLEMENTARY NOTE TO THE SATURNIANS.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

Since writing my paper (CAN. ENT., 263, ante*) I have been able to examine a specimen of the Asiatic *A. selen.* The moth differs from *luna*, chiefly in the pointed apices of fore wings, the outer margin sweeping inwardly in an even curve. I cannot consider this character of generic value, since precisely the same separates the South American *Eacles magnifica* from our *E. imperialis*. In the same species of certain Papilionides, a similar variation has been noted. The exterior bands appear faintly also in certain examples of *luna*, while the whiter colour is shown by the variety *Rossi*. Whether this tendency to white is reversionary in its nature, may be questioned. The tails are more developed in the Asiatic species, but (without denuding) I cannot find any neuronal differences. I conclude, then, that Leach's term *Actias* is also applicable to *A. luna*. On the other hand, the European *isabella* seems to admit of a distinct genus. This species is confined to a limited region of the Peninsula, and its geographical isolation has apparently preserved among its characters some which may have belonged to a more primitive type of tailed Saturnians. The American and the Asiatic species would be then nearer related, pointing to a different epoch of separation for the European form. The resemblance between the larvæ of *polyphemus* and *luna* seems to warrant the association of the genera, and justify my disposition of the groups. I take it that the members of the Attacid group: *Attacus*, *Philosamia*, *Callosamia*, are more highly specialized forms as compared with the Saturniid group: *Samia*, *Saturnia*, *Agapema*. These two groups would be nearer related in phylogenesis to each other than to the Teleid group, which stands at some little distance. Mr. Dyar writes me that in *Telea*, at the last stage, the larva shows a sparse coating of secondary hair, short and fine, most abundant at base of legs. In *luna*, on the contrary, the secondary hairs are most abundant dorsally, having enlarged ends, and are nearly entirely absent subventrally, except on the foot itself. From this fact, and that of the still greater reduction of the tubercles in *luna*, I am inclined to believe *Actias* the more specialized form, as compared with *Telea*; this view seems to be sustained by the moth stage and would bear out the position assigned to the genera in a linear series. It seems, then, probable that *Actias* and *Telea* represent a lateral branch of the family stem and that they have pursued to some extent a parallel development. This is shown by the greater uniformity in colour, the absence of contrasting ornamentation in the larvæ. In all stages these moths rely on protective resemblances, needed by insects so large and apparently so very helpless.

*On page 263, ante, foot-note, for "Xyloicus" read "Hyloicus."

COLEOPTERA TAKEN AT LAKE WORTH, FLORIDA—No. II.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

The latitude stated in the former paper ‡ should have been 26° 40'. This winter my location was six miles south from Pitt's Island, where the collecting was done last season. From February 1st to May 6th is the time included. During February and March few beetles occurred, as the temperature ranged from 52° to 74° and on one occasion fell to 27°. From the 10th to the 24th of April no collecting was done, and all but a few of the species enumerated were taken between the latter date and May 4th. The species not known to the writer to occur north of Florida are marked with a *; those extending westward around the Gulf, with a †; the others have a wide northern and western distribution. *Philonthus micans* is to be erased from the previous list, as that species does not occur in Florida, the black form of *alumnus* having been erroneously so determined.

†*Pasimachus subsulcatus*, Say.*Dyschirius sphaericollis*, Say.†*Clivina picea*, Putz.*Ardistomis viridis*, Say.*Lebia abdominalis*, Chd.†*Callida decora*, Fab.**Plochionus dorsalis*, Horn.**Apenes angustata*, Schwarz.†*Brachynus 4-pennis*, Dej.*Anatrichis minuta*, Dej.*Harpalus nitidulus*, Chd.†*Philhydrus consors*, Lec.*Cercyon prætextatus*, Say.*Silpha inæqualis*, Fab.†*Colpodota pulchra*, Kraatz.*Staphylinus tomentosus*, Grav.*Actobius*, n. s.*Lathrobium*, n. s.**Paederus obliteratus*, Lec.†*Erchomus laevis*, Lec.*Oxytelus insignitus*, Grav.*Olibrus vittatus*, Lec.**Stilbus floridanus*, Casey.*S. pusillus*, Lec.*Megilla maculata*, DeG.†*Psyllobora nana*, Muls.*Scymnus collaris*, 2 var., Mels.**Languria marginipennis*, Schwartz.*Lasconotus pusillus*, Lec.*Catogenus rufus*, Fab.*Laemophloeus*, sp.*Cryptomorpha desjardinsi*, Guer.*Loberus impressus*, Lec.*Dermestes vulpinus*, Fab.*Hololepta 4-dentata*, Fab.*Saprinus*, sp.†*Carpophilus tempestivus*, Er.*Trogosita virescens*, Fab.*Tenebrioides*, sp.*Cyphon variabilis*, var. *modestus*,

Lec.

Alaus myops, Fab.

‡ CAN. ENT., XXVI., p. 250, Sept., 1894.

- **Anchaustus asper*, *Lec.*
†*Monocrepidius suturalis*, *Lec.*
†*Ludius hepaticus*, *Germ.*
Glyphonyx recticollis, *Say.*
Melanotus communis, *Gyll.*
M. clandestinus, *Er.*
Chrysobothris chrysoela, *Ill.*
Photinus lineellus, *Lec.*
†*Photuris frontalis*, *Lec.*
Polemius, *sp.*
Aphodius ruricola, *Mels.*
A. stercorosus, *Mels.*
Clæotus globosus, *Say.*
Anomala undulata, *Mels.*
Euphoria melancholica, *Gory.*
Trichius delta, *Forst.*
**Leptostylus*, *n. s.*
Hippopsis lemniscata, *Fab.*
**Spalacopsis filum*, *Dur.*
**Lema conjuncta*, *Lac.*
Anomæa laticlavata, *Forst.*
†*Metachroma pellucidum*, *Cr.*
†*Dysonychia collata*, *Fab.*
Epitrix brevis, *Schwartz.*
E. parvula, *Fab.*
Coptocycla bicolor, *Fab.*
C. clavata, *Fab.*
†*Caryoborus arthriticus*, *Fab.*
Bruchus scutellaris, *Fab.*
B. obscurus, *Say.*
Alobates barbatus, *Knoch.*
**Blapstinus fortis*, *Lec.*
**B. estriatus*, *Lec.*
†*Tharsus seditiosus*, *Lec.*
Uloma punctulata, *Lec.*
Arrhenoplita viridipennis, *Fab.*
Platydema ruficorne, *Sturm.*
P. erythrocerum, *Lapl.*
†*P. subquadratum*, *Mots.*
P. subcostatum, *Lapl.*
**Hypophloeus*, *n. s.*
†*Talanus langurinus*, *Lec.*
**Cteniopus Murrayi*, *Lec.*
Oxaxis, *n. s.*
O., *n. s.* (blue).
**Mordellistena floridana*, *Smith.*
**M. splendens*, *Smith.*
Tomoderus interruptus, *Laf.*
Anthicus fulvipes, *Laf.*
Tyloderma variegatum, *Horn.*
T. æreum, *Say.*
Conotrachelus seniculus, *Lec.*
†*Cryptorhynchus minutissimus*, *Lec.*
**Baris nitida*, *Lec.*
**Trichobaris insolita*, *Casey.*
†*Cylas formicarius*, *Fab.*
**Sphenophorus apicalis*, *Lec.*
**Cossonus*, *n. s.*
Tomicus cacographus, *Lec.*
*Scolytidæ, *n. g. and n. s.*

The species listed number 101; of these, eight are undescribed and four undetermined. Eight species mentioned in Mrs. Annie Trumbull Slosson's list, published in the January number of the CAN. ENT., are also enumerated, namely: *Staphylinus tomentosus*, *Languria marginipennis*, *Cryptomorpha desjardinsi*, *Photuris frontalis*, *Coptocycla bicolor*, *Blapstinus fortis*, *B. estriatus*, and *Cteniopus Murrayi*. Also *Pasimachus subsulcatus*, *Harpalus nitidulus*, *Chrysobothris chrysoela*, and *Caryoborus arthriticus*, from her manuscript notes of captures at Lake Worth in December, 1894.

Staphylinidæ—Paderus obliteratus.—This beetle is abundant in April. The species occurring on the New Jersey sea-coast, usually determined *obliteratus*, is *P. floridanus*, which has likewise the elytral punctures more or less obliterated posteriorly, but very coarse anteriorly. *P. obliteratus* has a narrower head, longer elytra, with the punctures faintly indicated anteriorly and obsolete behind. It occurs as far north as St. Augustine, to my knowledge. *Bledius punctatissimus* occurred as formerly; one of the types of this species was from Southern California, and not that of *B. fumatus*, as a dislocation by the printer in the former paper makes it appear.

Languria marginipennis.—Abundant by sweeping weeds. April.

Cucujidæ—Catogenus rufus.—The larva of this widely-distributed species is eminently a wood borer, and in Southern Florida completes its transformations in about three months. Two mature beetles, in length .22 and .45 inch, respectively, were cut, April 25th, from sea grape (*Coccolobus*) killed by the December frost. The young larvæ started out about two inches apart, pursuing parallel routes for 23 inches before pupating. The beetles were over an inch from the surface, and no provisions had been made for their liberation. For the first ten inches of their course their burrows were eaten from the wood just beneath the bark and packed with borings; the remainder of the burrows, also firmly packed, were in the solid wood. The larva of the small beetle had the same supply of food as that of the larger. Why the disparity in size? And why burrow the same distance?

Cryptomorpha desjardinsi.—Several examples of this graceful species were taken in April in the unfolding leaves of the Banana killed by the December frost, and in a state of semi-putrefaction. The larvæ and pupæ were seen in the cellular structure of the leaf beneath the epiderm. The Florida examples are identical in form, size and coloration with those from British Columbia.

Scarabæidæ—Euphoria melancholica occurred abundantly, March 1st, on thistles (*cirsium*)—*Trichius delta*, many examples occurred, May 1st, on the blossoms of the wild olive (*Olea americana*). It extends to the extreme south of Florida, having been taken at Key West.

Leptostylus, n. s.—This is a small species, .16 to .20 inch in length, of an ashy-gray colour, and but slightly depressed; the antennæ are conspicuously annulated; the thoracic tubercles are close to the base and in some examples acute, as in *Liopus*; the elytra are obliquely truncated

at tip, with small black dots arranged in irregular rows and with two blackish angulated lines behind the middle. It breeds in the stems of a slender cucurbitaceous vine (*Melothria pendula*) which grows over fences and bushes in dense festoons. Mr. Schwartz took this species at Bay Biscayne, and it may occur in the Bahamas and Cuba.

Leptostylus transversatus.—This species breeds in stumps and logs of the Mastich (*Sideroxylon pallidum*). The larva lives entirely in the bark, where it pupates in a cell, after the manner of a *Urographis*.

Spalacopsis linum, Duv.—This species was taken abundantly in April and in May on the dead vines of *Melothria pendula*, in the dead stems of which both larvæ and pupæ were abundant. The beetle is exceedingly slender, varying greatly in size, and in length from .20 to .60 inch. It occurs also in some of the Bahama Islands and likewise in Cuba, and is thus described by Chevrolat [Tr.]: "*Euthuorus filum*, Duv.—Filiform; head closely punctate, grayish-brown, with three obsolete pale lines; thorax linear, closely punctate, brownish-gray, with an obsolete pale line on each side and down the middle; elytra brown, variegated with maculations, especially near the suture; the apex margined, obliquely truncate and produced, longitudinally sulcate, closely and strongly punctate, interstices elevated; antennæ and feet brown. Length, 8-11 mill.; width, $1\frac{2}{3}$ -2 mill." (An. France, Series 4, Vol. II., p. 256.) Mr. Schwartz previously took this species at Bay Biscayne. Its occurrence north from Lake Worth has not been noted, but the vine in which it breeds extends around the Gulf to Texas. The pertinacity with which it feigns death is extreme, and till it moves it can scarcely be distinguished in the umbrella from the broken vines.

Hippopsis lemnistica.—Taken abundantly with the foregoing species, but it breeds in the stems of other plants or weeds besides *Melothria*. It extends westward around the Gulf and as far northward as Eastern Pennsylvania.

Caryoborus arthriticus.—This species, as is known, breeds abundantly in the seeds of the Cabbage Palm (*Sabot palmetto*). From about one quart of the berries placed in a covered paper box I obtained more than 100 examples. This species, however, breeds in the seeds of other trees, as I raised once several examples from the seeds of the Coffee tree (*Gymnocladus Canadensis*).

Platydemia subquadratum, Mots.—While the Florida and Arizona examples are considered as belonging to one species, yet they have a

distinct facies, and the under-side is differently coloured; those from Florida being luteous brown beneath, while the Arizona examples are bright rufous.

Hypophlæus, n. s.—Three examples were beaten from *Melothria* vines, but whether they bred in them or in the cedar posts which supported them is not known, and the matter is mentioned to call the attention of future collectors. This species is narrower than *glaber*, which occurs also; the elytra are finely but distinctly punctured in close rows.

Talanus (Dignamptus) langurinus and *stenochinus*.—These two names represent the extremes of one species (Horn). Dr. Leconte having only one example of the latter and two or three of the former before him, and knowing nothing of the graduating intermediates, or the history of the species, found enough of differential points for two species. It was beaten abundantly from the dead vines of *Melothria*, in which it probably breeds, though I did not find larva nor pupa. It varies in length from .15 to .40 inch, which is no greater difference than is found in some other species, as *Spalacopris filum*, *Catogenus rufus*, etc. The colour of the types is represented as "black with a bluish gloss," and "black with a slight metallic gloss." All the examples taken by me, and others in my collection from Bay Biscayne and from Louisiana, are from light to dark castaneous. It requires a little faith to see any great resemblance to a *Languria*. Dr. Horn names the species as a whole *langurinus*.

Cryptorhynchus minutissimus, var.—This species was beaten in some abundance from both living and dead vines of *Melothria*, in which it probably breeds. The typical examples of this species in my collection from Louisiana, and also one taken at Lake Worth on another plant, have the thorax and elytra beautifully ornamented; but this variety is sordid brown, with the apical third of the elytra luteous. Some one hereafter may possibly describe it as a new species.

Trichobaris insolita, Casey. This species was taken abundantly in a patch of a species of ground cherry (*Physalis*), April 10th. None occurred afterwards nor elsewhere, though *Physalis* is abundant. It probably breeds in the stems of this plant, like *trinotata* does in the potato. I found a coleopterous larva in one of the plants, but no pupa, and so can not write with certainty.

Cylas formicarius.—Three examples were taken on the ocean beach from a rough, prostrate *compositous* plant, growing in mats on the sand. The species is said to depredate on the sweet potato, but in this

case there were no sweet potatoes or other convolvulaceous plants within half a mile. Many times I accompanied the gardener for sweet potatoes, but failed to find this species either above or under the ground.

Rhyncophorus cruentatus.—This species breeds in the dying trunks or stumps of the Cabbage palmetto; before pupating the larva forms an excavation, in which it constructs a cocoon in which to pupate; this cocoon is from an inch and a-half to two inches in length, its walls being over one-sixteenth of an inch in thickness, composed of fibre, cemented with some glutinous secretion.

Cossonus, n. s.—Under the bark of a dead limb of the Rubber tree (*Ficus aurea*) five examples were taken. The basal half of the elytra, metasternum and abdomen are rufous. Length, .12-.14 inch.

Scolytidae.—An undescribed species belonging to a new genus (*Schwartz*) occurs in the dead or diseased bark of the *Ficus* in incredible numbers. It breeds entirely in the bark, and it is not possible to trace its galleries. Length, .04-.05 inch.

NOTES ON THE INSECT FAUNA OF SOMERSET CO., MAINE.

BY PHILIP LAURENT, PHILADELPHIA.

The following notes and observations were made during a two-weeks' stay in this county, ending on August 29th. The greater portion of our collecting was done in the neighbourhood of King & Bartlett Lake, and along the road leading out to Eustis. This section of Maine, if not the entire State, is anything but an "entomologist's paradise." The country is mountainous and covered for the most part with a dense growth of spruce, pine, birch, etc. Very little land in the entire county is under cultivation, so that those insects which we naturally look for in such places are almost entirely wanting. Many beautiful lakes are to be found in this part of Maine, but here again the entomologist is doomed to disappointment, as the water of the lakes is of an icy coldness, and very few aquatic insects are seen. The nights are invariably cold and but few insects are attracted to light. In a heavily-timbered country, such as we find in Somerset Co., Maine, it would naturally be supposed that the fallen trees would yield an abundance of insect life, particularly Coleoptera. A search of two hours, in which I overturned many dead trees and removed the bark from many others, resulted in the finding of exactly eight specimens of Coleoptera, and common species at that. Collecting with the umbrella and beating-net was a waste of time, as little or nothing rewarded our efforts. *Cicindela*

longilabris, Say, was found in abundance on the road to Eustis by Dr. Skinner, during his visit to this part of Maine in 1894; but this year only three or four specimens were observed. The only other *Cicindela* seen was *12-guttata*, Dej., which was quite common. A specimen of *Monohammus marmorator*, Kir., was the best capture in the line of Coleoptera. The following Coleoptera were also captured: *Tachys nanus*, Gyll.; *Pterostichus honestus*, Say; *Coccinella trifasciata*, Linn.; *Hyperaspis fimbriolata*, Melsh.; *Dicerca tenebrosa*, Kir.; *Ellychnia corrusca*, Linn.; *Aphodius fimetarius*, Linn.; *Trichius affinis*, Gory; *Rhagium lineatum*, Oliv.; *Monohammus confusor*, Kir.; *Monohammus scutellatus*, Say; *Doryphora 10-lineata*, Say; *Luperus meraca*, Say; and *Meloe angusticollis*, Say. In the capture of Lepidoptera we were somewhat more successful; not that this order was in any way better represented, but in the fact that some of our captures were new to our cabinets. There was not a lepidopterous insect observed of which we could say it was common. *Pieris rapæ*, Linn., outside of the small kitchen garden, was extremely scarce. *Grapta faunus*, Edw., possibly the commonest of all the Lepidoptera observed, was by no means very abundant, as only eighteen specimens were captured during our two-weeks' stay, and then only after a persistent effort on our part to secure them. *Grapta gracilis*, G. & R., a very desirable species, of which we secured nine specimens, was one of the few good things secured in the butterfly line. The small white aphid on which the larva of *Feniseca tarquinius*, Fab., is said to feed, was very plentiful on the branches of the black alder, but of *Feniseca* itself we only saw one or two specimens. On both occasions when I visited the alders it was after a heavy rain, and this may have had something to do with the scarcity of *Tarquinius*. Following is a list of Lepidoptera secured during our two weeks of collecting: *Argynnis atlantis*, Edw.; *Argynnis myrina*, Cram.; *Phyciodes tharos*, Dru.; *Grapta faunus*, Edw.; *Grapta gracilis*, G. & R.; *Grapta progne*, Cram.; *Grapta j-album*, Bd. & Lec.; *Limenitis arthemis*, Dru.; *Limenitis disippus*, Gdt.; *Chrysophanus hypophlæas*, Bdv.; *Pieris rapæ*, Linn.; *Colias philodice*, Gdt.; *Papilio turnus*, Linn.; *Arctia virgo*, Linn.?.; *Mamestra renigera*, Steph.; *Hadena arctica*, Bdv.; *Hadena modica*, Gn.; *Caradrina multifera*, Walk.; *Cirroedia pampina*, Gn.; *Scoliopteryx libatrix*, Linn.; *Pseudaglossa lubricalis*, Geyer; *Therina fervidaria*, Hbn.; *Cleora semiclusaria*, Walk.; *Triphosa dubitata*, Linn.; *Petrophora prunata*, Linn.; *Pinipestis Zimmermanni*, Grt.; and *Crambus vulgiva-*

gellus, Clem. Some little collecting was done in the other orders, and among the Hymenoptera the following have been kindly identified by Mr. Wm. J. Fox: *Urocerus flavicornis*, Fab.; *Urocerus albicornis*, Fab.; *Ichneumon grandis*, Brull.; *Paniseus glaucopterus*, Linn.; *Vespa maculata*, Linn.; *Vespa germanica*, Linn.; *Bombus bifarius*, Cress.; *Bombus vagans*, Sm.?; *Pompilus tenebrosus*, Cress.; *Odynerus leucomelas*, Sauss.; and a species of *Halictus* not yet identified. Of the other orders the greater part of our captures are as yet unidentified. Dr. Wm. Hughes and Dr. Henry Skinner, my companions on this trip, rendered me much valuable assistance in securing specimens.

NOTES ON PSYCHODA.

BY NATHAN BANKS, SEA CLIFF, N. Y.

Mr. Alex. D. MacGillivray has sent me some Psychodidæ from Ithaca, N.Y., for names.

Psychoda Slossonæ, Will.

One male (June). The wings are clothed with blackish hair, and with two broad irregular white bands. The fringe on the posterior margin is blackish (in *superba* whitish); the abdomen clothed with white hairs (in *superba* with black); the legs are paler and with more white hair than in *superba*; and the white hair on head and thorax is not as long nor as dense as in *P. superba*. A female (Aug.) which is larger and more thickly clothed with white hair is, perhaps, the same as Williston mentions, and is, I think, the female of this species.

Psychoda albitarsis, n. sp.

Wing moderately broad, tip not very acute, clothed with blackish hair; some specimens show a patch of more dense hair on the middle near the costal margin; the fringe is black except at the tip, where it is white; behind the fringe is over four times as long as the width of a cell; head, thorax and abdomen densely clothed with black hair; legs with dense black hair, except the tarsi, which are white or pale yellowish. Antennæ very short, pale, with whitish hair. Length of wing, 2.4 mm.

Differs from *P. nigra* by white apical fringe, and white tarsi and less pointed wing; from *P. marginalis* by larger size, white tarsi and black haired body. Eight specimens, June and July, on *Rubus odorata* at Ithaca, N.Y.

Psychoda alternata, Say.

A few specimens of this species from Ithaca, N.Y., are smaller than those from Long Island.

Psychoda cinerea, Bks.

One specimen from Ithaca of this species is not quite as dark as the types.

NOTE ON THE LARVA OF HEMILEUCA CALIFORNICA,
WRIGHT.

BY HARRISON G. DYAR, NEW YORK.

In CAN. ENT., 1894 (Vol. XXVI., p. 293), Prof. G. H. French described the early stages of this species, but failed to get the larvæ past their second moult. Prof. French kindly sent me eggs, and I have raised the larva through all its stages. It is, however, exactly like the normal *H. maia*, already described by Prof. Riley and Dr. Lintner, as we might expect from the position to which the moth has been assigned. I will, therefore, not take up space to redescribe the several stages in detail. The characters of the tubercles and setæ are such as I have described for the Hemileucidæ (Trans. N. Y. Acad. Sci., XIV., 55), and are the same as in *Pseudohazis*. In my account of the genus (*Psyche*, VII., 91), the statements about the arrangement of the setæ are inaccurate, owing to insufficient amplification (only a lens was used). I add, therefore, figures of the thoracic and abdominal setæ, stages I. and II. of *Hemileuca*, showing the true arrangement, and these may be considered to stand also for *Pseudohazis*.



FIG. 23.

The peculiar shortening of wart i. takes place in stage III., and hence is not shown here.

It will be noticed that stage I. (Fig. 23) represents a primitive first stage, with tubercles iv. and v. consolidated and all the tubercles except three on the cervical shield and tubercle ii. on abdomen hypertrophied. In stage II. the tubercles are converted into elongate warts by the addition of setæ, but no sub-primary tubercles appear. A few secondary setæ may be distinguished, and these become abundant in later stages, parallel with the increase in number of spines on the elongated warts.

BOOK NOTICES.

AN ATTEMPT TO CORRELATE THE RESULTS ARRIVED AT IN RECENT PAPERS ON THE CLASSIFICATION OF LEPIDOPTERA. By James William Tutt, F. E. S.

This paper very instructively and readably puts together the conclusions attained by Comstock, Dyar, Chapman and Hampson on the subject, which is one which has lately received gratifying attention. It positively rains classifications! Hardly have I mailed off the *Systema* when Dr. Packard sends me a "New Classification," and it must be confessed that printers' ink has not been spared at the birth of the New Lepidopterology. Therefore this paper, in the *Trans. Ent. Soc.*, of London, Pt. III., for Sept., 1895, by Mr. Tutt, comes opportunely and affords useful reading. Mr. Tutt states at the outset, that this paper is not offered in a spirit of adverse criticism to any one of the particular lines indicated and worked out at length by these various authors. But, on the whole, the neurulationists come off a little the worse and for the apparent reason that their use of a single organ, with a limited field for the expression of its development, is open to the fatal objection that the same peculiarities are offered along different lines of descent. That this is actually the case appears from the result which Dyar, on occasion, obtains from the larval tubercles as compared with that obtained by Comstock from the wings. Undoubtedly the wings show evolution and indicate phylogenetic lines, but ultimate peculiarities of venation are not decisive of affinity in all cases. The time has perhaps gone by when a moth is excluded or admitted into a family on the sole ground that the costal vein merges with the subcostal, or springs free from base of the wing, or is separate a little way and then touches the subcostal at a certain point. "It is also evident," says Mr. Tutt, "that the results of the various systems, whether based on larval, pupal, or imaginal characters, must be compared, and the sum total of evidence brought together, if a satisfactory result is to be obtained." Towards the comprehension of the points of the various systems, Mr. Tutt's digest will certainly contribute.

Dr. Packard's New Classification seems, on reflection, exclusive of Prof. Comstock's. Upon the mouth parts of a smaller moth, referred not long ago to the genus *Micropteryx*, Dr. Packard founds a suborder, *Lepidoptera laciniata*, and refers *Micropteryx* and *Hepialus* into the other suborder, *Lepidoptera glossata*, which contains thus so nearly the whole of the order that it might be almost as well to refer the *Eriocephalidæ* to the

Trichoptera and be done with it. The objection that Comstock's Frenatæ includes many Lepidoptera without a frenulum is somewhat paralleled by the fact that some of Dr. Packard's Lepidoptera glossata (Fabricius's term for the order) have no tongue. The difficulty of "combining" these two systems lies in the fact that different organs are employed. Dr. Packard's paper closes with a genealogical tree at which my old friend, Mr. W. H. Edwards, if he is still standing on his rock and is not washed away by Dyarian waves, will no doubt lift his hands in astonishment. Dr. Packard has virtually abandoned the old Latreillean camp and joined the ranks of the new school.

In a far wider sense than as a correlator of contending systems, Mr. Tutt merits respect for his untiring industry and his success in raising the standard of scientific Lepidopterology in England; I might almost say in Europe, for the study itself has been in some danger of following the objects of the study, into the useful hands of the dealers in insects. With ever fresh enthusiasm and all the power of expressing himself clearly, Mr. Tutt combines both point and poetry, so that to read one of his discussions on synonymy is a pleasant task. The student, whether objectively of science, or subjectively of nature, cannot fail to be benefitted by Mr. Tutt's writings.

A. RADCLIFFE GROTE, A. M.

THE BUTTERFLIES OF NORTH AMERICA, with Coloured Drawings and Descriptions, by W. H. Edwards. Third Series, Part XVI. Houghton, Mifflin & Co., The Riverside Press, Cambridge, Mass.

Though nearly a twelve-month has gone by since the preceding Part was noticed in our pages, we could well afford to wait with patience for another issue, when our author rewards us with so much that is remarkably interesting, as well as valuable, regarding the life-histories of some hitherto little known Butterflies.

The first plate, which as usual is exquisitely drawn and coloured, depicts the female of *Parnassius Smintheus*, Doubl.-Hew., and both sexes of the variety *Hermodur*, Hy.-Edw., together with the egg, larva in all its stages, chrysalis, last segments of the male butterfly, and many highly magnified details. After giving a description of the various stages of the insect, the author relates many most interesting facts regarding the life and habits of the butterfly, which have taken expert observers in the

States of Colorado, Montana, and Washington, no less than twenty years to accumulate. The account is concluded with a description of the formation of the extraordinary pouch or keel which is to be seen beneath the abdomen of the females of various species of *Parnassius*. That this should be formed by the male is one of those strange marvels that render the careful study of the lives of our Butterflies so interesting and attractive.

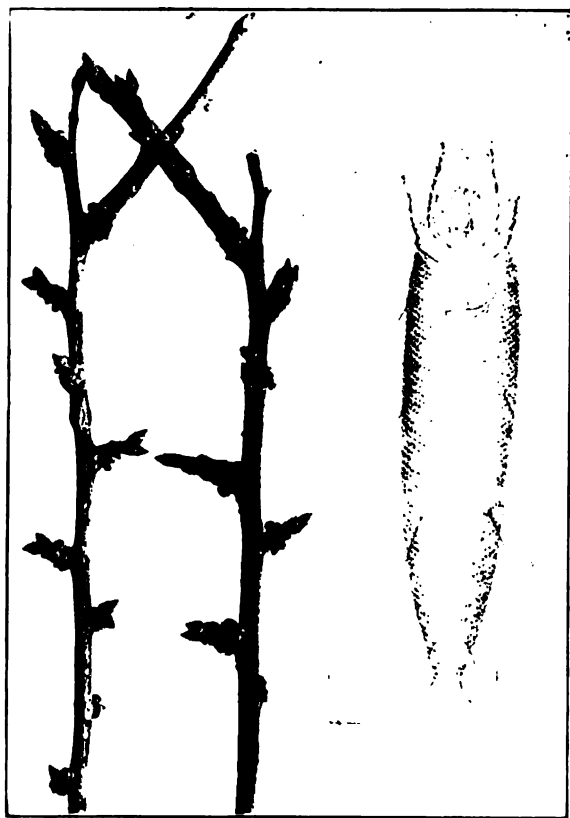
The second plate depicts both sexes of *Satyrus Charon* and the male of its variety *Silvestris*; also the egg, the various stages of the larva, the chrysalis, and many details. The imago and the several preparatory stages are described, and a short but interesting account is given of the habits of the butterfly and the rearing of the larvæ.

On the remaining plate are figured the egg, three stages of the larva with details, and both sexes of the imago of the British Columbia species *Chionobas Gigas*, Butler. After describing the preparatory stages so far as known, the author relates the differences in appearance and habitat between this species and *Californica* and *Iduna*, which are frequently confused in collections. *Gigas* is shown to be confined, so far as is yet known, to Vancouver Island, where the male frequents the tops of the highest mountains, the female being usually found much lower down. *Iduna* inhabits the slopes of the evergreen redwood forest in North-eastern California on the Pacific Coast; and *Californica*, the hot, arid regions of East Oregon, Washington, and the semi-desert portion of North-east California. "*Gigas* is semi-arctic, living amid the cold, dark fir forest; *Iduna* is temperate, living in the mild, dark redwood forest; *Californica* is semi-tropical, living in open, dry, warm glades in the 'bush-land,' on the border between the forest and the open plains. *Gigas* alights on bare rocks; *Iduna* on green twigs; *Californica* on dead or dry grass." But we must refer the reader to the book itself for all the interesting particulars regarding these strange Butterflies.

The wonder to us is that so few Entomologists subscribe to this magnificent work. The Parts are issued at such long intervals that the cost is very light; those who have secured them know what a treasure they possess and how highly they prize it.

Mailed November 4th, 1895.

CAN. ENT., XXVII., PLATE 6.



THE PLUM-TWIG GALL-MITE (*PHYTOPTUS PHLOEOCOPTES*, NAL.)

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THE PLUM-TWIG GALL-MITE.

Phytoptus phlæocoptes, Nalepa.

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

In January, 1895, I received from a fruit grower at Industry, Pa., several plum-twigs which were badly infested with what was to me a new pest. Two of these twigs are shown, natural size, on the accompanying plate. It will be seen that a ring of small, sub-spherical excrescences encircles the base of each bud and also the bases of two short shoots. The correspondent wrote that he had 400 trees badly infested, and a majority of the plum trees in his neighborhood were affected. The Damsons seem especially subject to attack, but all varieties suffer more or less.

The excrescences were then of a dark brown colour, with a slight reddish tinge. Usually a slit-like opening could be distinguished on the surface. Upon carefully cutting through one of the excrescences, I was surprised to find a cavity in the interior that was packed nearly full of very minute whitish creatures, which proved to be four-legged mites or Phytoptids. Thus, these excrescences were the galls formed by the mites, and in which they were then hibernating. There were hundreds of the mites in each gall and all of them in a dormant condition. Thus, each twig was harbouring thousands of the little creatures. The fleshy portion of the galls, between the cavity and the outer skin, is of a dark magenta colour. The galls vary in size, some of the larger ones containing two or three cavities.

But little is known of the life-history of this curious gall-mite. The correspondent writes that the mites also live in the galls during the growing season. They probably leave the galls in which they hibernate and form new galls in the summer. On several twigs I found a ring of old, dry, deserted galls below a ring of inhabited galls.

Having ascertained the nature of the pest, I ransacked the literature for records of similar attacks by gall-mites. In *Insect Life*, Vol. I., p. 343, is recorded some correspondence which Dr. Riley had in January,

1888, with a fruit grower at Marlborough, N. Y., regarding what was doubtless this same Plum-twigg Gall-mite. In this instance the galls also occurred along cracks on the bark of larger limbs, and in close connection with the Black Knot fungus, which was, of course, accidental. Again in 1891, Dr. Riley (Insect Life, Vol. V., p. 17) records a small mite as injurious to Damson plum trees at Berlin Cross Roads, Ohio. This was probably the mite under discussion. These are the only records I have found in American literature of any mite making galls on plum-twigs.

There has recently appeared in the European literature three admirable and exhaustive papers on the Phytoptidæ, by Dr. Alfred Nalepa [Sitz. der Math.-Natur. Classe der kais. Akad. der Wiss., Abtheil. I., Vol. 96 (1887), pp. 115-165; Vol. 98 (1889), pp. 112-156; Vol. 99 (1890), pp. 40-69]. Each article is accompanied by several finely executed plates. *Luckily, I had access to Dr. Nalepa's work, and I found that but one Phytoptid had been described which lived in galls on the twigs of plum trees. In Vol. 99, p. 54, he describes and figures this mite as *Phytoptus phlæocoptes*. In figure 2, I have reproduced (photographically) one of Dr. Nalepa's figures of the mite; it is the female and is magnified 450 diameters. The mites in the galls were very similar to, if not identical with, this European species. The only noticeable difference is in the shape of the body. The Pennsylvania mites are shorter and wider, but this may be quite possibly due to their being in hibernation and dormant. The European species was first described and figured as *pruni*, by Amerling, in 1868.

The mites could have been easily introduced into this country on plum stock, but the correspondent writes that his trees were grown in his vicinity "and are known as sucker-growth trees." If our mite is identical with the European species, and it probably is, the pest was introduced into this country some time previous to 1887, and it is now present in New York, Ohio, and Pennsylvania.

The fruit grower informs me that his trees are thrifty, but the fruit is undersized. So many thousands of the little creatures working at the

*Dr. Nalepa puts our knowledge of the Phytoptidæ on a scientific basis. He rightly discards all previous descriptions of the mites as inadequate and not definite enough for the determination of any species. He gives new detailed descriptions with excellent figures; and the species are renamed, usually with new names, but sometimes the old names are retained, as in the case of the Pear-leaf Blister-mite, which he calls *Phytoptus pyri*, n. sp. We should thus write *pyri*, Nalepa, instead of *pyri*, Scheuten. Dr. Nalepa's work should be in the hands of every one interested in the Phytoptidæ.

bases of the buds must greatly lessen the vitality of the whole tree. When the mites occur as numerous as shown in the figures, they must prove a serious pest; and, with our present scanty knowledge of their life-history, they will prove a hard foe to combat. So far as we know, the mites are securely protected in their gall-homes during the whole year. Possibly there may be a few days, when they are leaving their galls to form new ones, that they could be hit with an insecticide. It is doubtful if kerosene emulsion will penetrate the galls, but it is worthy of a trial on a few trees during their dormant period; dilute the emulsion with only three or four parts of water, and make it by the Riley-Hubbard formula. The only other suggestion I can now make is to prune the trees as closely as possible, taking pains to cut out as many gall-bearing twigs as practicable, and to burn all prunings. As most of the galls are on the twigs, millions of the mites could be destroyed in this way.

I am indebted to the "Rural New Yorker" for the use of the figures of this mite and its work.

PARTIAL PREPARATORY STAGES OF SOME MOTHS.

BY G. H. FRENCH, CARBONDALE, ILL.

Catocala Minuta, Edw.

Full-grown larva.—Length about one inch. As in most *Catocala* larvæ, seven stripes, the dorsal gray, lilac tinted; the next blackish-gray, paler on the middle of the joints; the next about the same colour, but tinted with the reddish-orange that forms the broad bordering lines between the stripes; the next also blackish and below this dull orange. The bordering lines on the back whitish, distinct white on the folds; lateral fringe orange tinted. Piliferous spots orange, the posterior pair to each joint more prominent than the anterior pair; the anterior pairs on joints 6 to 8 paler. The posterior part of joint 9 elevated and white between the spots; back of the elevation, and reaching down to the legs, orange tinted black. Head dull lilac-gray, mottled with white, a blackish patch above on each side and in front two black spots on each side. Venter yellowish-white, with black patches in centre of joints.

Chrysalis.—Length, .65 inch; diameter of thorax, .23 inch; tongue- and wing-cases extending back to posterior part of 5, the tongue-case as far back as the wing-case; tapering back from 5; abdominal joints very shallowly punctured, the punctures scarcely perceptible with the lens;

wing-cases much smoother than usual ; cremaster hooks—two large ones at the tip of segment, and several small ones from near the base of these and some at a little distance from them. Colour chestnut-brown, covered as usual with a white powdery secretion. The puparium a case of leaves thinly lined with silk.

Pupal period, 20 days ; food plant, Honey Locust.

Agrotis brocha, Morr.

Egg.—Diameter, .03 inch, height the same ; blunt conical, tapering abruptly from near the base to a rounding base ; longitudinally striated, 30 of these reaching the micropyle, about 60 of these striæ in all ; marked with cross striæ, but these not prominent ; centre of micropyle a round, slightly elevated piece. Colour various ; some gray, some whitish blotched irregularly with red, the blotching being mostly a spot on the micropyle and a ring below. Duration of this period, 9 days.

Young larva.—Length, .07 inch ; cylindrical. Colour of body pale smoky-white ; head black ; piliferous spots moderate, a white or pale hair from each. Duration of this period, 7 days.

After first moult.—Length, .15 inch ; colour pale greenish-brown ; head black ; piliferous spots small, black ; a small cervical shield. In confinement, ate clover and radish leaves.

Apatela spinigera, Guen.

Mature larva.—Length, 1.20 inch ; when crawling, nearly cylindrical ; with eight rows of tubercles, the lateral ones very small ; the dorsal pair on joints 3 to 7 rather large, with the tallest on 3 and gradually diminishing back ; joint 12 prominently elevated, the elevation tipped with a pair of tubercles, with a pair of small ones in the front part of the elevation, each tubercle bearing a single long and several short hairs. Colour bright green, the lateral tubercles scarcely discolouring the sides, slightly yellowish-green ; a dorsal dark reddish-purple stripe that is nearly as wide as the head on the anterior part of 2, about half as wide on 3, narrow on 4 to 7, expanding in two ellipses on 8 and 9, the rest of the way narrow. From 2 to back of tubercles on 3 the stripe is bordered each side by clear white, coloured a little with green on 8 and 9, with a faint greenish line running through the centre of the stripe. Head rosy-red, whitish on the sides, with three more or less complete longitudinal rows of black spots. Feet and venter green.

Food plant, apple. Hibernated in the pupa, which was not described.

CURIOUS BEHAVIOUR OF EUDAMUS PYLADES LARVA.

BY H. H. LYMAN, MONTREAL.

When out on a short visit to Ausable Chasm, June 29th to July 1st, I noticed, on June 30th, a female of this species ovipositing, and secured three eggs. These eggs hatched in due course, one about a day in advance of the two others. The first larva was placed on a clover leaf in a tin-topped jelly glass, but refused to feed and dried up. I then arranged a homeopathic vial of water in a wine glass, with earth to steady it, and a few leaves of clover passing through a hole in the cork into the water, and placed the two other newly hatched larvæ upon the leaves. One immediately set to work constructing its nest, but the other seemed lazy and not inclined to make a nest for itself, or share in the construction of the other. The nest was soon complete, and the occupants hidden from view. What tragedy took place within that nest I know not, but at the first moult only one caterpillar remained, and I thought that possibly the energetic one had lost all patience with his lazy brother, and had eaten him up. The dates of the first three moults were not recorded, but the fourth one occurred on 3rd of August. The caterpillar was apparently mature by the 12th or 13th, and had left the food plant and spun some silk on the gauze top of the glass cylinder which I had placed over the wine glass, stretching several strands of silk from the gauze to the glass. I was leaving home on the 14th for a holiday at the seaside, and as I had a whole menagerie of other larvæ to take with me, and thought that this caterpillar was just going to spin its cocoon, and that disturbing it to take it with me would be a mistake, I left it behind. On my return, twenty-two days later, I found it apparently in exactly the same place as I had left it, though, of course, it may have crawled all over the cylinder during my absence, and it was still alive, though somewhat shrunken from its long fast. I immediately supplied fresh leaves in the small vial of water, and, taking the gauze from the top of the cylinder, arranged it so that the back of the larva was resting on the clover leaves, but it would not feed, and so, after a day or two, I replaced the gauze on the cylinder. The caterpillar then crawled down to a position near the base of the cylinder, where it rested for two or three days longer, and then was found dead on the window-sill, on which the cylinder was standing, having lived without food for fully four weeks in warm summer weather.

ENTOMOLOGICAL COLLECTIONS OF THE U. S. NATIONAL MUSEUM.

The staff of the Department of Insects of the U. S. National Museum at Washington has been reorganized, as a result of the sad death of the former Honorary Curator, Professor C. V. Riley.

The reorganization has been effected by the appointment of Mr. L. O. Howard, Entomologist of the U. S. Department of Agriculture, to the position of Honorary Curator of the Department of Insects ; of Mr. Wm. H. Ashmead, to the position of Custodian of Hymenoptera ; and Mr. D. W. Coquillett, to the position of Custodian of Diptera. All museum custodians are honorary officers. Mr. M. L. Linell will remain as general assistant to the Honorary Curator.

The Department is at present in excellent working condition. It contains a very great amount of material in all orders, and in many unusual directions surpasses any collection in the country. Among others the following are of especial interest :—

- (1) The large collection, in all orders, of the late Dr. C. V. Riley.
- (2) All of the material gathered during the past eighteen years by correspondents, field agents, and the office staff of the Division of Entomology, U. S. Department of Agriculture.
- (3) The greater part of the collection of the late Asa Fitch.
- (4) The large collection, in all orders, of the late G. W. Belfrage.
- (5) The collections in Lepidoptera and Coleoptera made by Dr. John B. Smith down to 1889, together with the types of the Noctuidæ since described by Dr. Smith.
- (6) The collection of Lepidoptera of the late O. Meske.
- (7) The collection of Lepidoptera of G. Beyer.
- (8) The collection of Coleoptera of M. L. Linell.
- (9) The bulk of the collection, in all orders, of the late H. K. Morrison.
- (10) The collection of Diptera of the late Edward Burgess.
- (11) The type collection of Syrphidæ made by Dr. S. W. Williston.
- (12) The collection of Ixodidæ of the late Dr. George Marx.
- (13) The collection of Myriopoda of the late C. H. Bollman.
- (14) Sets of the neotropical collections of Herbert Smith.
- (15) The collection of Hymenoptera of Wm. J. Fox.
- (16) The collection of Tineina of Wm. Beutenmuller.
- (17) The large Japanese collection, in all orders, of Dr. K. Mitsukuri.

(18) The African collections, in all orders, of Dr. W. S. Abbott, Wm. Astor Chanler, J. F. Brady, the last "Eclipse" expedition to West Africa, and of several missionaries.

(19) The large collection from South California of D. W. Coquillett, in Coleoptera, Hymenoptera, Lepidoptera, and Orthoptera.

(20) The Townend Glover manuscripts and plates.

In addition to this material there are minor collections, which have been the result of the work of Government expeditions, or are gifts from United States Consuls, and many private individuals.

This enormous mass of material is being cared for by the active and honorary force of the Department, and the perpetuity of the collection is assured. The National Museum building is fireproof, and this, together with the fact that it is a national institution, renders the Department of Insects perhaps the best place in the United States for the permanent deposit of types by working specialists in entomology, and for the ultimate resting-place of large collections made by individuals.

The policy of the Museum at large, with regard to the use of its collections by students, is a broad and liberal one. Students are welcome in all departments, and every facility is given to systematists of recognized standing.

NOTES ON APHILANTHOPS.

BY CARL F. BAKER, FORT COLLINS, COLO.

Within a short time two very interesting species (*4-notatus*, Ash., and *taurus*, Ckll.) have been added to this genus. I have lately received another new species from Mr. Chas. Palm, of New York City, collected in S. W. Utah, which is even more interesting than the two above mentioned. I describe it herewith :

Aphilanthops utahensis, n. sp.—Male: Length, 7.5 mm. Rufous; region of ocelli, mesonotum, metapleura, and fifth and sixth abdominal segments above, blackish. Markings pale lemon-yellow. Head evenly, somewhat sparsely punctate, covered with silvery pubescence, which is very dense on the face, extending over the bases of the mandibles in two pointed tufts. Clypeus with a yellow spot on either side, the median lobe strongly tridentate, the teeth short and blunt. Antennæ with scape yellow; flagellum slightly darker above. Thorax coarsely irregularly punctured, except on prothorax, scutellum, and postscutellum; pubescence most marked on mesopleura and sides of metanotum. Pronotum above, tegulæ and two spots below, scutellum anteriorly, and post-

scutellum, yellow. Wings normal. Fore and middle femora beneath at tip, hind femora above at tip, and all the tibiæ outwardly, yellow. Abdomen somewhat more remotely punctured than the head, feebly pubescent. Dorsal segments 1-5 with yellow bands; that on third interrupted at the middle, the two portions inwardly pointed; that on first strongly bent forward. Sixth segment with a median hemispherical yellow spot on posterior half. Seventh segment above not characteristic in structure. Ventral segments with punctures very coarse and remote; second, third, and fourth, with strong yellow bands, all slightly interrupted medially.

Hab.—S. W. Utah. (Chas. Palm.)

This pretty and very distinct species is as near *q-notatus* as any of the species of *Aphilanthops*, though it is as widely separated from all others by the tridentate clypeus as is *q-notatus* by the peculiar structure of the last dorsal segment.

The female of *q-notatus*, which has never been described, differs most noticeably from the male in size, the length being about 11 mm.

The North American species of the genus may be separated as follows:—

Clypeus strongly tridentate; ground colour throughout rufous; metathorax without spots.....*utahensis*.

Clypeus evenly rounded; ground colour of at least head and thorax black.

Last dorsal segment rectangular and strongly concave; clypeus margined with yellow; legs rufous; metathorax with a yellow spot on either side; ground colour of three basal segments of abdomen rufous.....*q-notatus*.

Last dorsal segment pointed, strongly convex; legs yellow and black; ground colour of abdomen black.

Bands of abdomen broad, continuous; clypeus yellow; metathorax with a yellow spot on either side; size small.....*laticinctus*.

Bands of abdomen, at least the first three, interrupted at middle; size large.

Clypeus and part of face above yellow; antennæ mostly rufous; metathorax with a yellow spot on either side.....*frigidus*.

Clypeus, face and antennæ, black; metathorax without spots.....*taurulus*.

THE LARVÆ OF THE NORTH AMERICAN SAW-FLIES.

BY HARRISON G. DYAR, PH. D., NEW YORK.

It appears from a reference to the literature, that the larvæ of less than 25 per cent. of the Tenthredinidæ listed as inhabiting the north-eastern United States and Canada have been described. Of the Western species, scarcely half a dozen are known.

It seems desirable that something should be done to increase interest in this neglected subject, and I have thought it well to prepare a synoptic table of the larvæ already known, to facilitate the recognition of specimens and better indicate those as yet undescribed, and therefore needing study.

In the following table the Western species are excluded. If, by good fortune, any student of this group should arise there, he would find the field practically clear.

To the eighty odd species described I have added about forty well-marked forms, the diagnoses being taken from my notes on larvæ not yet reared; but as I intend to determine them as rapidly as possible, I have thought it best to include them, indicating them by marks to correspond with my notes.

The species of *Schizocerus* are omitted. *S. fumipennis* is Californian, and the two sweet-potato feeders, *S. ebenus* and *S. privatus*, are so imperfectly described that I cannot place them.

I shall be grateful to receive notes of any corrections or additions and the names of any of the undetermined forms.

RECOGNITION TABLE FOR THE KNOWN SAW-FLY LARVÆ OF THE
NORTHERN ATLANTIC STATES.

- | | | |
|----|---|----|
| 1. | { Abdominal feet present on joints 6-13; rarely rudimentary or
absent in leaf-mining forms..... | 2 |
| | { Feet on joints 6-11, either present on joint 13 or rudimentary.
Cocoon compact, dark brown | 27 |
| | { Feet on joints 6-10, or slight on joint 11; cocoon reticular, of
yellow silk..... | 48 |
| | { Without abdominal feet. A pair of long antennæ on the head
and jointed processes on the last segment | 53 |
| 2. | Sitting flat on the surface of the leaf; slug-like..... | 3 |
| | Sitting on the needles of pine..... | 18 |
| | Sitting on the edge of a leaf or curled spirally..... | 20 |
| | Leaf miners..... | 26 |
| 3. | Shining, sticky, slug-like..... | 4 |
| | Smooth, not shining..... | 10 |

- Body with rough points or spines 15
 Body with forked processes 16
4. Large, blackish (Prunus, etc.) *Eriocampa cerasi*.
 Smaller, not blackish 6
6. Sides of thorax orange tinted 7
 Sides of thorax not orange tinted 8
7. Head black *Eriocampa fasciata*.
 Head pale *Monostegia quercus coccinea*.
8. Head pale 9
 Head black *Caliroa obsoleta*.
9. On Quercus, usually gregarious *Monostegia quercus-alba*.
 On Prunus, scattered 3S*
10. Head more or less black 11
 Head pale 14
11. Body high, larvæ robust 12
 Body slender, as usual 13
12. White and yellow; on Fraxinus *Monophadnus barda*.
 Gray and yellow, spotted with black; on Polygonatum (Solomon's
 seal) 4D.
13. With slight angles or rudimentary points on joint 2; a faint blackish
 band; on Betula *Taxonus multicolor*.
 Smooth, waxy white; on Epilobium 6M.
14. Yellowish, immaculate; on Rosa *Monostegia rosæ*.
 With a pruniöse coating; on Alnus *Poecilosoma inferentia*.
15. Head pointed; on Betula, etc., etc. *Strongylogaster pinguis*.
 Head round; on Spiræa *Blennocampa spirææ*.
 Head black; on Vitis *Blennocampa pygmæa*.
16. Head green; on Rubus *Monophadnus rubi*.
 Head black spotted; on Quercus 17
17. Green *Periclista emarginata*†
 Dorsum purplish *Monophadnus diluta*.
18. Without spots; head black; on Abies *Lophyrus abietis*.
 Similar (?) to the preceding; on Pinus *Lophyrus pini-rigidæ***
 With angular black spots 19
19. Head black, no subventral spots; on Pinus strobus. *Lophyrus Abbotii*.

*My notes are indicated by a combination of numbers and letters.

†Described as *Blennocampa bipartita*.

**Insufficiently described.

- Head red, small subventral black spots ; on Pinus
rigida.....*Lophyrus Lecontei*.
 Similar (?) to the preceding *Lophyrus pinetum***
20. Feeding on grass and grain (Poa, etc.)..... 21
 Feeding on ferns (Pteris, Onoclea, etc.)..... 22
 Not feeding on these plants..... 23
21. Ochreous, immaculate..... 4C.
 Gray dorsally, white subventrally..... 5O†
 Green, a black band over head..... 5M.
22. A row of subventral orange spots... ..*Strongylogaster luctuosus*.
 No orange, but head black spotted... ..*Strongylogaster annulosus*††
 Immaculate green*Strongylogaster soriculatus*††
 On Onoclea ; head and anal segment black spotted..... 5G.
23. Woolly white, gray or blackish..... 24
 Green, yellowish or colourless..... 25
24. Large, greenish white, somewhat granular—
 A black dorsal stripe..... *Cimbex americana*.
 No dorsal stripe..... *Trichiosoma triangulum*.
 With long dense white wool in flattened masses ; on
Carya.....*Monophadnus carya*.
 Woolly white ; on Cornus *Harpiphorus tarsatus*.
 White, downy ; on Polygonum..... *Emphytus testaceus*.
 Immaculate with white bloom ; on Diervilla..... 4I.
 Dorsum gray, pruinose, a black patch on head ; on Corylus... 5F.
 White pruinose, a black band on head, a row of lateral black dots ;
 on Sambucus..... *Macrophya tibiator*.
 White with slight bloom and smoky-black markings ; on
 Rubus *Strongylogaster apicalis*.
 Blackish-gray ; on Viola..... *Emphytus Canadensis*.
 Olivaceous-blackish ; on a "perch" on Quercus, young leaves.... F.
 Leaden-gray, pruinose with black dots ; on Cephalanthus..... 5C.
 Gray with orange and black spots ; on Lonicera (honeysuckle). 2F°
 Dorsum olivaceous-black with gray squares, subventer yellow ; on
 Cornus 60

**Insufficiently described.

†Five larvae of *Dolerus* spp. similar to this are described, but not identified.

††These names may require to be transposed.

°Described by Norton as *Hylotoma McLeayi*.

25. Greenish-ochre, a black subdorsal line; on
Alnus *Hemichroa americana*.
Bluish-green, spotted with yellow and black; on
honeysuckle *Zaræa inflata*.
Whitish, faintly orange banded; on Sambucus 6I.
Like the preceding, but also black spotted 6L.
Green or colourless, often with minute white or black points—
On Rumex; dorsum green with dark longitudinal
shades *Strongylogaster abnormis*.
On Rosa; green *Emphytus cinctipes*.
On Betula; subdorsal yellow fat-granules.. *Tenthredo Cressoni*.
On Spiræa; a yellow subdorsal fat-line, no white points ... 5T.
On Viburnum; with minute black points..... 6C.
On Ilex; colourless, whitish 6F.
On Fragaria (strawberry); head immaculate.. *Monostegia ignota*.
Like the preceding, but the head black
spotted..... *Harpiphorus maculatus*.
26. Mining in leaves of Alnus *Fenusa varipes*.
Mining in leaves of Quercus..... *Fenusa curta*.
27. Sitting flat on the surface of a leaf or curled spirally..... 28
Sitting on the edge of a leaf..... 33
Forming galls on Salix..... 45
28. With stiff white hairs..... 29
With pilose coating 30
Pale, with large elevated subventral black patches; on Salix.... .5J.
Smooth, greenish 31
Colourless, the abdominal feet small..... 32
29. Anal plate black..... N.
Anal plate yellow..... { *Trichiocampus gregarius*.
 Trichiocampus viminalis.
30. Dorsum olivaceous-black *Cladius solitarius*.
Immaculate green; on Rosa..... *Cladius pectinicornis*.
With white ad-dorsal and stigmatal lines; on Salix..... 4L.
31. Slightly pruinose; on Amelanchier and Prunus... *Nematus thoracicus*.
With subdorsal green fat-granules; on Betula... *Nematus unicolor*.
Curled spirally; on Populus..... 2G.
32. Head pale; on the young leaves of Quercus.. *Acordulecera dorsalis*.
Head black; on the young leaves of Carya 6U.

*Colour of head not stated in the description, hence this position may be erroneous.
**Position of the pale line not stated.

- Honey-yellow and black ; on *Betula* *Cresus latitarsus*.
Honey-brown and leaden-black ; on *Corylus* and *Alnus*. *Nematus coryli*.
42. Green with black spots ; on *Populus* . . . *Nematus Hudsonii-magnus*.
All black ; on *Salix* *Nematus ventralis*.
43. The tubercles minute dorsally 44
The tubercles of nearly equal size ; body blue green ; on
Ribes *Nematus ribesii*.
44. "Black spotted" *Nematus pallidiventris**
A row of subdorsal black spots *Nematus salicis-odoratus*.
No subdorsal black spots *Nematus brunneus* **
45. Gall formed in the stem or bud 46
Gall formed in the leaf 47
46. A lateral bud enlarged before it begins to expand in
spring *Euura salicis-orbitalis*.
A round sessile swelling lengthwise on the side of small
twigs *Euura salicis-ovum*.
A gradual enlargement of the twig, five-fourths to twice its normal
diameter *Euura salicis-nodus*.
47. Fleshy, sessile, the shape of a quarter of an
orange, evenly divided between the two
surfaces of the leaf *Nematus salicis-desmodioides*.
Fleshy, globular, sessile, like a miniature apple, .3-.5
inch *Nematus salicis-pomum*.
Subspherical, hollow, growing from a side vein, .2-.3
inch *Nematus salicis-pisum*.
48. Tubercles in a square above the spiracles, more or less distinct . . 49
A single large subdorsal black tubercle ; on *Rhus copallina* *Z*.
49. Body with a pale subdorsal line 50
Body not lined 51
50. Head black or red ; on *Salix* *Hylotoma clavicornis*.
Head pale with a vertical dark band *Hylotoma virescens* (2 L).
51. Head red ; spots distinct ; on *Betula* { *Hylotoma pectoralis*.
Hylotoma scapularis.
Hylotoma caeruleus.
Head black 52
52. Spots distinct ; on *Prunus* *Hylotoma McLeayi* (S).
Spots pale, often dark ringed ; on *Quercus coccinea* 2 B.

*Description imperfect. Possibly not different from the following.

**Described as *N. monochroma*.

-
53. Head dark..... 54
 Head testaceous or greenish..... 55
54. Head black, body orange tinted ; on Prunus..... Q†
 Head black, body dull olive-green ; on Abies..... Pack., No. 35††
 Head dark brown, body pale reddish-brown ; on
 Abies..... Pack., No. 36
 Head pale reddish with a black spot between antennæ ; on
 Pinus..... Pack., No. 82
55. Anal plates not black spotted..... 56
 Anal plates with black patches..... 57
56. On Corylus..... *Lyda ochreata*.
 On Viburnum..... 6B.
 On Amelanchier..... 5W.
 On Pinus strobus..... Pack., No. 83
57. Antennæ all white ; on Populus..... 5Y.
 Antennæ black ringed ; on Betula..... 4K.
-

I add descriptions of two species which are here referred to for the first time.

Fenusa curtus, Norton.

Mines on the upper side of the leaves of *Quercus macrocarpa*, the mature mines about 50 x 10 or 30 x 15 mm. The larva has six stages with widths of head .3, .4, .6, .75, 1.0, and 1.0 mm. The early stages are very similar to the fifth.

Fifth stage.—Head very flat, the lobes rounded with the ocellus on the dorsal aspect ; mouth projecting in front ; shining pale brown, shading into dark brown on the sides of lobes and mouth ; eye black ; width, 1 mm. Body much flattened, rounded posteriorly, the segments of nearly equal width, joint 13 divided by a distinct incisure, the posterior part only half as wide as the anterior ; a rounded subventral ridge. Thoracic feet small, black, almost lateral in position, unused ; abdominal, none. A large brown-black cervical shield on joint 2 dorsally and a similar one ventrally between the thoracic feet of joint 2, large, quadrate, brown, bordered with black posteriorly. Colour slightly shining sordid

†Supposed by Prof. Riley to be *Lyda fasciata* ; not bred.

††No. 35 of spruce insects in Packard's 5th report U. S. Entom. Commission. I have included Dr. Packard's undetermined saw-fly larvæ only in the case of *Lyda*, which is such a well-marked genus.

greenish-white; length, 5 mm. The larva is not transparent, rather grayish. The cast skins are light cinereous and may all be found in the mine intact, thick and opaque.

Sixth stage.—On assuming this stage, the larvæ burst through the upper skin of the mine and fall to the ground, where they enter the earth.

Head more rounded than before, the mouth scarcely projecting. Pale watery-yellowish, the eye concolorous; width, 1 mm. Subventral ridge prominent, undulate. Thoracic feet concolorous, scarcely distinguishable. Body translucent-white with a yellow tint, becoming darker or ochreous on the thoracic segments.

Larvæ from Plattsburg, N. Y.

Hylotoma virescens, Klug.

I have recently described this larva under the name *Hylotoma McLeayi* (2L). The male flies sent to Mr. Marlatt were positively determined as *McLeayi*, confirming my own determination. However, some female flies, subsequently emerged, seem not to differ from my specimens named *clavicornis*, in which the posterior half of the abdomen is black. But, as the larvæ are quite different, I would suggest to revive the name *virescens*, Klug., from the synonymy for them. Food plants: Betula, Salix, Amelanchier, Pyrus (choke-berry and mountain ash) and Fragaria (strawberry).

Hylotoma, sp.

The larvæ marked 2B have been bred, but only males so far. Consequently I hesitate to apply a name to them.

Hylotoma clavicornis, Fabr.

Eggs (deposited by a fly with abdomen all reddish).—Laid in the edge of a leaf of Salix in the usual manner. The young larvæ are paler than the mature ones and very faintly marked. Gradually they assume the mature characters.

Mature larva.—Head rounded, full at the vertex, the sutures obscured, shining black or light red or intermediate, a little paler around the mouth; width, 1.8 mm. Thoracic feet very large, spreading; abdominal small, on joints 6–11 and 13, a spot on joint 13 representing the foot there, the posterior feet the smaller. On the body are nine black tubercles in a square, the middle anterior one a little out of line, the anterior row smaller, confused on the thoracic segments. Some small spots in a row ventrally and one behind the spiracle. Subventral ridge with a large black spot and on some segments with two or more small ones. Setæ minute, black. Body greenish-yellow, with a whitish tint, more green dorsally; a whitish subdorsal line between tubercles 1 and 2. Thoracic feet except at joints and abdominal ones outwardly black; anal feet yellow.

Larvæ from Plattsburg, N. Y., and Jefferson, N. H.

The larvæ of *clavicornis* are frequently gregarious, whereas those of *virescens* are almost always found singly.

TWO NEW CROCOTAS FOUND IN WESTERN
PENNSYLVANIA.

BY GEORGE A. EHLMANN, PITTSBURG, PENN.

Crocota rubricosta, n. sp.—♀. Antennæ and eyes black; palpi and prothorax reddish-brown; head a little lighter than the prothorax; thorax dark brown, almost black; abdomen dark brown, tipped anally with red. Under side of abdomen and thorax, including the legs, light reddish-brown.

Primaries: Upper side obscured with dark velvety-brown, slightly tinted, or dusted, with red on the costa. Secondaries: Dark brown, almost black, with a large red elongate spot on the costa—hence the name *rubricosta*.

Under side of primaries light brown; costa fiery red; the inner marginal area is also heavily dusted with red. Under side of secondaries fiery red, shaded along the anal margin with dark brown; the limbal space has a brown angulated bar, beginning at the discal cell and widening outwardly; discal spot dark brown, almost black; fringes dark brown. Exp., one inch and three-eighths. Hab.—Jeanette, Pa.

Since drawing up the above description I have been so fortunate as to secure a male in the same locality. The female was taken while beating a Hawthorn for beetles, while the male was captured around an electric light. The male corresponds with the description given of the female in every respect, except that the shade of the ground colour is a little lighter on both surfaces, and the discal spot is present on the primaries as well as on the secondaries. The species bears more resemblance to *C. opella*, Grote, than to any other North American species that I am acquainted with, but the description that I have given will show in what respects it differs.

Crocota belmaria, n. sp.—♂. The whole upper surface is obscured with pale slaty-brown, almost of a greyish-mouse colour; the under side is much lighter, almost buff, including the legs. ♀. The upper surface is a little darker than in the ♂, and without any shading; the under side is a little lighter than the upper, but not as light as in the ♂; the costa of the primaries has a slight shading of red. Exp.—♂, $1\frac{1}{8}$ inch.; ♀, $1\frac{1}{4}$ inch. Hab.—Pittsburg, Pa.

I know of no North American species with which I can compare *C. belmaria*; it is the most peculiar species of this genus that I have yet met with.

THE LIFE-HISTORY OF PAMPHILA MANITOBA, SCUDDER.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

I think that I am the first man who has witnessed the hatching of the eggs of *Pamphila Manitoba*. I take pleasure in the belief; and I am glad to add another chapter to the history of our North American Rhopalocera.

Pamphila Manitoba is a sub-Arctic species. The first specimens taken in the neighbourhood of Quebec were captured by Mr. Hanham and myself in September, 1892 (See 23rd Rep. Ent. Soc., Ont., p. 31). The species had, in previous years, been taken at Rivière-du-Loup *en bas*, Cacouna, Metis, and Gaspé (See Mr. H. H. Lyman's article, 22nd Rep. Ent. Soc. of Ont., p. 27). In 1893, it appeared at Quebec on the 5th of August, and this year a specimen left the chrysalis, in my house, on the 21st of July. It would seem as if change of climate and locality were bringing forward the insect's time of appearance.

In the first week of August, 1894, I confined two or three impregnated females of the species, in a gauze cage, over a pot of lawn-grass. I obtained eggs from them on the 8th of the month. The eggs were laid dispersedly on the blades of grass and on the gauze cover. On the approach of winter I sank the pot to the rim in a flower-bed in my garden, leaving the grass and cover with their precious burden untouched. In the course of the winter the snow accumulated above them till it was six feet deep.

As soon as the gauze covering showed itself in the spring, I dug up the pot and carried it into my study, and then carefully removed the portions of grass, etc., on which the eggs appeared—placing them in a perforated cardboard box with a glass cover, which I set upon my study table. The eggs, therefore, were after that time constantly under my observation.

On the 20th of April I noticed a minute dot on the very summit of one of the eggs. I brought a magnifying glass to bear upon it, and found that the enclosed larva was biting its way to liberty; the black head of the creature was showing through the opening that it had made. I could detect the motion of its jaws as it enlarged the orifice. It continued the operation at intervals through the day and following night, and next morning, having bitten the shell down till it resembled the walls of a game pie, it crawled out. It left no *debris*; it had simply made a meal of the upper crust of its shell.

In the course of two days and nights sixteen larvæ had thus set themselves free. As each left the egg I took it up with a moistened camel's-hair pencil, and placed it on a tuft of timothy (*Phleum pratense*, L.) that I had rooted in a small bottle of mud, and soon I had the satisfaction of seeing the young stock begin to feed.

The fifth day seemed to be a critical period for the larvæ, and I lost several. Why this was I cannot tell. I could detect no signs of a moult. Becoming alarmed, I divided my brood, placing half out of doors on an isolated patch of grass, which I protected with a wire dish-cover. This provision proved a failure, for a small ground-beetle found its way to the larvæ, and devoured them. I adopted every precaution I could think of to save the six specimens I had left. I was careful to have healthy growing plants of grass always ready for them. I covered them with a glass shade to protect them from sudden changes of temperature. Whenever a mild rain fell I let them have for a few moments the benefit of the shower, and I kept them where they would have plenty of light without being exposed to the extreme heat of the sun. These precautions were crowned with success. I brought several of the larvæ to their full growth, and eventually I had the satisfaction of seeing the perfect insect burst from its chrysalis. The following is a detailed account of the insect in its different stages:—

Newly-laid Egg.—Nearly one-twentieth of an inch in diameter at the base. The shape of a gumdrop—flat at the bottom and rounded above. Snow-white, and in some lights irrorated with red, blue, and green.


Egg in the Spring.—Somewhat shrunken—one twenty-fourth of an inch in diameter. Dull white. Surface rough, and slightly indented. Hatched April 20th.

NOTE.—*P. Manitoba* spends eight months, or two-thirds of its existence, in the egg.

Newly-hatched Larva.—Length, one-tenth of an inch. Head large, round, jet-black, shining, has an indented line down the middle, and a few whitish bristles scattered over the face. Plate or collar on the second segment glossy black. First pair of legs black. Colour of body, that of yellow wax, marked at wide intervals with round brownish spots. The second and third pairs of true legs and the pro-legs, the same colour as the body. The creature spun a slight web for a rest, something

after the plan of *P. turnus*, and, on the 5th of May, it drew the edges of the blade of grass together, and spun a light web about itself. It moulted on the 8th of May.

Larva—Second stage.—Length after moult, three-twentieths of an inch. Head and collar black as before. Colour of the rest of the body pale waxen-yellow. The spots have developed into warts, and the body is dotted over with short black spines.

In this stage the larva made for itself a retreat by gathering several blades of grass together, and fastening them with a beautifully reticulated web, the meshes of which were as perfect as those of a cabbage-net. A funnel-shaped opening allowed the larva to protrude as much of its body as it deemed safe, to enable it to feed. In feeding, it bit from the blades till semicircular gaps were formed, thus : . It moulted May 21st. The skin of its head came away complete, like a helmet; the larva apparently having withdrawn its head from the neck opening.

Larva—Third stage.—Length, four-tenths of an inch. Head and collar jet-black as before; the former indented. Colour of body, pale grass-green. The larva in this stage is thickly set with black spines or processes. On the third and fourth segments, above the second and third pairs of legs, are, on either side, twin dark brown warts, one above the other and near together—thus (:). Over the last pair of pro-legs is a large and conspicuous wart of the same nature, and on each of the other segments are three smaller warts, one above another at wide intervals. Above the claspers are a number of bristles. The larva moulted on the 2nd of June. The head-case came away as before.

Larva—Fourth stage.—Length after moult, seven-tenths of an inch. Head deeply indented, black, with two dull yellow stripes extending down the face. Body dull greenish-yellow, very thickly set with black processes and brownish warts, giving the effect of a dull grass-green. The large wart above the hindmost pro-leg, on either side, larger and more conspicuous than before.

On the 12th of June the larva became quiescent, resting in its nest. On the 13th I noticed that the skin had parted at the neck, and that the creature was withdrawing its head (which was white and resembled parchment) from its old case. The process was not completed till 10 o'clock a. m. of the next day. Then the head rapidly darkened to black.

Larva—Fifth stage.—Head as before. Body of a dark sage-green, approaching to brown, and thickly set with minute black warty processes. A dark dorsal line and an indistinct spiracular line (of a lighter tint than the body colour) mark the larva in this stage. The spiracles are black, and the fore legs black; the pro-legs are of the colour of the body. Between the 10th and 11th and the 11th and 12th segments, on both sides at the bottom, are conspicuous white patches (or breaks in the skin), the nature of which I do not understand. The larva attained its greatest size on the 24th of June. It was then an inch and two-tenths long. It continued to feed till the end of the month. It then became restless, and shrank up considerably. On the 3rd of July it fixed upon a place for its nest. It gathered the surrounding blades of grass together and bound them with a net-work of silk, in which were flakes of whitish scurf [Query.—Did these come from the white side patches?]. It changed to the pupa on the 6th of July. Its head-case and skin came off together and fell to the bottom of the nest.

Chrysalis seven-tenths of an inch long. Head-cover and wing-cases mouse-colour. Abdomen dull yellow, with a tinge of blue above. The Imago appeared on the 21st of July—the chrysalis case having opened from the back of the head to the back of the thorax to allow of its escape.

Imago ♂.—Expanse of wings 1.6 inches; length of body .6 inch. Basal half of the primaries; ochre-yellow; outer half, brown. Near the apex is a broken curve of ochreous dots. In the centre of the wing is a long metallic dash in a dark brown setting; fringes brown. The secondaries are brown with ochreous spots and dashes; fringes gray. Underneath the primaries are paler than above, and the secondaries are sage-green with small white lunettes edged on the inner side with brown, and arranged in a double curve.

Imago ♀.—Somewhat more robust in form than the male, and deeper in colour—the brown prevailing. Instead of the metallic dash there is merely a brown patch in the middle of the fore wing. The ochreous spots on the upper side of the secondaries are more conspicuous than in the male.

The perfect insect frequents the flower-heads of *Solidago lanceolata*, L., and has a bold and rapid flight. Last season I did not see a single specimen at large.

NOTE ON THE SETÆ OF THE LARVÆ OF THYATIRIDÆ,
AND A CORRECTION.

Recently I have examined the larvæ of some European Thyatiridæ, and find the setæ arranged exactly as in our species. [See Proc. Boston Soc. Nat. Hist., 1894, p. 399.] The supplementary seta behind iii. varies a little in position, but is uniformly present. The species examined are *Habrosyne derasa*, *Thyatira batis*, *Bombycia or*, *B. duplaris*, *Asphalia ruficollis*, and *A. fluctuosa*. A correction must be made in my description just referred to (pp. 400-401). The species there described in all its stages as "*Thyatira scripta*" is really *Pseudothyatira expultrix*. The following list may straighten out the matter :—

Habrosyne scripta.

1883. Thaxter, Papilio III., 10. Describes egg and sixth stage.

Pseudothyatira cymatophoroides.

1863. Grote, Proc. Ent. Soc., Phil., II., 124. Sixth stage.

1883. Thaxter, Papilio III., 10. Sixth stage.

1895. Dyar, Proc. Bost. Soc. Nat. Hist., XXVI., 400. Egg, all stages (as *Thyatira scripta*).

Euthyatira pudens.

1889. Dyar, CAN. ENT., XXI., 209. Mature larva.

Thus, the larvæ of only thirty-three per cent. of our species of Thyatiridæ are known. This is a poor showing for such a small family. Of the Notodontidæ fully sixty-six per cent. are known.

HARRISON G. DYAR.

A NEW GENUS AND SPECIES IN THE APHELININÆ.

BY L. O. HOWARD, WASHINGTON, D. C.

I recently received from Mr. T. D. A. Cockerell, Las Cruces, New Mexico, a minute parasite of a Cero-plastes on *Euphorbia hypericifolia* from the Red Hill district of Jamaica, which was transmitted to him by Dr. M. Grabham. Both genus and species prove to be new, and are printed separately, partly for the reason that my revision of the Aphelininæ of North America has recently been published and I do not expect to do any extensive work on the subfamily again for some time, and partly for the reason that Mr. Cockerell wishes to use the names in the Journal of the Institute of Jamaica. The description follows :

Aneristus, n. gen.

Resembles *Coccophagus*. Flagellum of antenna strongly flattened. Scape short, inserted just above the mouth and reaching to middle of face; pedicel short, triangular, as long as broad. Funicle joint 1 twice as long as pedicel, somewhat longer than broad. Funicle joints 2 and 3 each shorter than 1, and 3 shorter than 2; each about as broad as is joint 1 at tip. Club distinctly 3-jointed, a little broader than funicle joint 3; joints 1 and 2 of club subequal in length and each as long as funicle joint 3. Joint 3 of club about as long as 2, somewhat narrower at base than 2, pointed at tip. In other respects resembles *Coccophagus*, except that the hind tibiae are considerably flattened and have a row of short stiff bristles above. Middle tibial spur long and slender, nearly as long as first tarsal joint.

Aneristus ceroplastæ, n. sp.

Female.—Length, .8 mm.; expanse, 1.6 mm.; greatest width of fore wing, .27 mm. Mesonotum finely and closely shagreened, with sparse, rather long, dark pile; eyes hairy. Colour black, slightly shining, all coxæ and femora black; front and middle tibiae and all tarsi pallid; hind tibiae black. Wings with a very large discal infuscated patch, covering nearly half the wing area.

Described from two specimens reared by T. D. A. Cockerell from *Ceroplastes* on *Euphorbia hypericifolia* from Jamaica.

CORRESPONDENCE.

Sir,—On looking over my paper in the CANADIAN ENTOMOLOGIST, I note one or two unfortunate errors. Page 313, lines 8 and 10, read *C. helloides* and *P. tharos* in lieu of "Epixanthe" and "Pratensis." The specimens that I thought to be "epixanthe" and "pratensis" respectively were determined by Mr. Fletcher to be only varieties of "helloides" and "tharos," and the error in my paper seems to have escaped notice and correction. I may here mention that this spring I took several specimens of *Lycæna sapiolus*, which has hitherto appeared rather scarce in this neighbourhood. This last season has been the worst, from an entomological point of view, I have had since I came to the country. I have never seen so few insects, either Diurni or Noctuæ; and even the number of mosquitoes was considerably diminished. During May and the early part of June we had constantly frost at night, which seemed to do great damage to insect life.

E. F. HEATH, The Hermitage, Cartwright, Man.

BOOK NOTICE.

THE NATURAL HISTORY OF AQUATIC INSECTS, by Professor L. C. Miall, F. R. S. London and New York. Macmillan & Co. (66 Fifth Avenue, N. Y.) Price, \$1.75. Pp. 395.

This interesting work is intended, as the author states, "to help those Naturalists who take delight in observing the structure and habits of living animals," and also to revive an interest in the writings of some of the old Zoologists who did notable work in their day, but who are now almost forgotten, namely: Lyonnet, Reaumur, Swammerdam and De Geer, of whose lives and work he gives a short account.

To any lover of Nature, who wishes to look into the lives and doings of living creatures and to investigate their structure and appliances for carrying on the business of their lives, this book will prove a very great help as well as an unfailing pleasure, and it ought to lead many a reader to explore for himself the ponds and pools in his own neighbourhood, which teem with insect life. The different groups of insects that live in the water in their larval or perfect states are treated of in turn: water beetles and the larvæ of many flies, the caterpillars of some moths, caddis worms, May-flies, Alder-flies (*Sialidae*), stoneflies (*Perlidae*), Dragon-flies, pond-skaters, water-boatmen, etc. The very names of these insects bring to mind what one cannot fail to have seen and watched and wondered over. To have many of these wonders explained and described, and to have the insects themselves depicted and the peculiarities of their structure made clear by excellent wood-cuts, is what we owe to the author of this book, and we hope that many will turn to its pages with profit and delight. It is a handsome volume, with clear, large type and a number of very good illustrations.

THE FIRST ANNUAL REPORT of the Entomological Society of Ontario, 1870 (published early in 1871), has just been reprinted *verbatim* by the Department of Agriculture for Ontario. It was thought best to reissue the volume without any alterations or attempt to bring it down to date, as it is chiefly wanted for completing sets in libraries and private collections. That there should be a demand for a work of this kind nearly a quarter of a century after its first publication is a somewhat remarkable event. Copies may be obtained by applying to Mr. J. A. Moffat, Victoria Hall, London, Ontario.

Mailed December 9th, 1895.

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WILLIAM H. EDWARDS.

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WILLIAM H. EDWARDS.

Our readers will all, we are sure, be glad to receive with the first number of a new volume of the CANADIAN ENTOMOLOGIST the accompanying excellent portrait of the well-known and now venerable Entomologist, Mr. W. H. EDWARDS, of Coalburgh, West Virginia. His life-long work has been the study of Diurnal Lepidoptera, and the results of that work are splendidly set forth in the beautifully illustrated volumes of his "Butterflies of North America." In April, 1868, the first part was issued, and at once commended itself to entomologists everywhere by the exquisite beauty and finish of the plates and their faithfulness to nature. In July, 1872, the first Series, forming a large quarto volume with fifty plates, was completed. The second Series, containing fifty-one plates, was begun in May, 1874, but not finished until November, 1884, the less frequent issue of the parts being more than compensated for by the increased value of both plates and letterpress. When the work was begun, as Mr. Edwards stated in his preface, little or nothing was known of the eggs, larvæ or chrysalids of any except the commonest butterflies, and accordingly his first volume illustrated only the perfect state. In 1870 he made the notable discovery that eggs could be satisfactorily obtained by confining the female butterfly of any species with the growing food-plant of its larva, and at once began the study of the life-histories of a number of species previously known only in the imago state. The results of these studies are admirably set forth in the letterpress as well as in the plates of the second and third Series; on these are accurately depicted eggs and larvæ in their different stages, as well as chrysalids and imagoes. Many wonderful discoveries have been made during these investigations, among the first being that of the seasonal trimorphism of *Papilio Ajax*, and the dimorphism of *Grapta Interrogationis*, and of *G. Comma*. The process of breeding was soon taken up by Mr. Edwards's friends and correspondents all over North America, and, aided by the general extension of railways over the Continent, he was able to get eggs of butterflies from widely distant localities,

and to follow them successfully through all their stages. Thanks to his efforts, the reproach of ignorance of the preparatory states of our butterflies has been removed, and though much remains to be learnt, vast progress has already been made. The first part of the third Series was issued in December, 1886, and in October last we had the pleasure of welcoming the sixteenth. Far from showing any decline from the Author's high standard of excellence, this last issue may justly be regarded as the climax of good work, both on the part of the writer and the artist. All through Mr. Edwards has been fortunate in having his wishes so ably carried out by his artist-assistants, Mrs. Mary Peart, of Philadelphia, who has drawn most accurately nearly all the plates, and, in order to do so satisfactorily, has reared most of the caterpillars, and Mrs. Lydia Bowen, who has so exquisitely performed the work of colouring.

In addition to the great work that we have just referred to, Mr. Edwards has contributed largely to the periodical literature of science, especially to the Proceedings and Transactions of the American Entomological Society and the CANADIAN ENTOMOLOGIST. His first contribution to our pages was published in the third number of our first volume, in 1868, and he has continued to favour us with articles of great value ever since; his last paper, in the September number of Volume XXVII., being the one hundred and sixty-eighth which he has written for our journal.

Mr. Edwards was born on the 15th of March, 1822, and will soon complete his seventy-fourth year. That he may long be spared in health and prosperity to carry on his excellent work is the cordial wish of the writer and all his friends.

C. J. S. B.

THE "BOMBYCES": WHAT ARE THEY?

BY HARRISON G. DYAR, PH. D., NEW YORK.

It might be better to say "what were they?" in an article addressed to readers of to-day, since the name in its old sense will not be found in the most recent writings of Packard, Comstock, Chapman, Grote, and other authors. However, the group is adopted in our latest check-list (Nos. 877-1459), although without its name, Prof. Smith stating that he could not limit the group to his satisfaction. Also, as recently as 1893, Dr. Packard published an "Attempt at a new classification of the Bombyces," including in the group all the families formerly included, but altering their sequence. Following the arrangement of suborders pro-

posed by Prof. Comstock, and the division into superfamilies which I have suggested and which Mr. Grote has adopted with improved nomenclature*, let us see where the families of "Bombyces" fall.

From the JUGATÆ, we find the Hepialidæ only, the most highly specialized Jugates in respect to the abortion of the mouth parts. From the FRENATÆ as follows :—

Superfamily Tineides.—The Eucleidæ, Megalopygidæ, Anthroceridæ and Pyromorphidæ from the apex of development along the main stem ; the Psychidæ, Lacosomidæ and Heterogynidæ, side branches, but all specialized (the much specialized Sesiidæ went with the Sphingidæ), and finally the Cossidæ, a low type, but of large size.

Superfamily Agrotides.—All the families, except those called Zygænidæ, the Agrotidæ and Geometridæ, the two latter (with the exception of the Notodontidæ) the lowest types in the superfamily.

Superfamily Bombycides.—The whole group.

Superfamily Sphingides.—None, this group being recognized as distinct, although the Sesiidæ and Thyridæ were associated with it.

Superfamily Papilionides.—None.

Thus it will be seen that the Bombyces consisted of the higher types in all lines of development, regardless of relationship. If we imagine the genealogical tree of Lepidoptera as growing upright from the ground, the several branches and twigs representing the families and being of length proportional to their degree of specialization, the old classification would be represented by *horizontal* planes. The uppermost would cut off the very summit of the tree, the Papilionides ; the next would take the next succeeding top branches, perhaps the Sphingides, and the tip of a side branch from the Tineid trunk, say the Sesiidæ. The next cut might give the old Zygænidæ, consisting of some families from the Agrotid and Tineid trunks, and the fourth cut is our Bombyces, taking branches of all the trunks that are approximately equal in degree of specialization. The base of the tree would comprise the rest of our old familiar families, the Noctuidæ, Micros, etc.

It is the aim of more recent work to follow the lines of genealogy, a classification cutting our imaginary tree in *vertical* planes, including in each group all families related to each other in the same line of descent, regardless of degree of specialization.

*Syst. Lep. Hildesheim, 1895.

CONCERNING FELTIA, AND OTHER MATTERS.

BY JOHN B. SMITH, SC. D.

The question asked by Mr. Slingerland in his very interesting paper in the CAN. ENT., XXVII., p. 301, is in great part answered by himself. I think he shows very conclusively that *subgothica*, Haw., is correctly used for our American species, and has given us a very full statement of the evidence upon which he bases his conclusions, thus removing the matter from the domain of unsupported opinion. From the nature of the case, and in the absence of Haworth's actual type specimen, the proof cannot be absolute; but until something more definite is supplied, I think the conclusions of the paper on the identity of *subgothica*, must be accepted. As to the synonymy, I think Mr. Slingerland is also correct. I have not found the A. O. U. Code clear on this matter, though it is as to genera in the same case; but, after consulting Dr. C. Hart Merriam, a recognized authority on questions of nomenclature, I am assured that Guenée's name *jaculifera* must sink as a synonym. On this, the main features of the paper, I accept all of Mr. Slingerland's conclusions; but I was a little surprised to find him defending genitalic characters as possibly good for generic divisions, in the apparent belief that I had used these characters as a basis for my division of the mass of species I found lumped as *Agrotis*! I believe that, with the possible exception of Mr. Scudder, no one in America has studied the genitalia of more insects of all orders than I. Certainly no one has figured more, and no one has insisted more strongly upon the value of these characters for specific distinction. I have examined in some cases over one hundred specimens of a single species without discovering appreciable variation, and while I was engaged in the study of *Lachnosterna* I examined nearly 2,000 specimens of the *fusca* group alone, for these characters. Yet, while insisting on their specific value, I have also pointed out that while easily distinguished species often have very similar genitalic structures, very closely allied species—superficially—may have them utterly unlike. Nowhere have I ever claimed that genitalic characters afford good bases for genera; on the contrary, I am distinctly of the opinion that they should not be used except in very special cases. The only instance where I have yet found it desirable to make use of them as a sole character, is in the series of species which I have called *Porosagrotis*. That is an expediency genus, and stated as such, with the reasons for it.

Yet, somehow, the idea seems to be current that all my work, in *Agrotis* at least, is based on genitalic characters only! Mr. Dyar, in a book notice, CAN. ENT., XXVII, 225, says: "Under *Agrotis* the *genitalic divisions** of Prof. Smith are given subgeneric value only, a proceeding which commends itself to the present reviewer." So Mr. Slingerland, on pp. 306 and 307 of the paper already cited, accepts this as a correct statement, and voices a doubt as to the value of such a basis. I was interested enough to write Mr. Slingerland on the subject, and he frankly acknowledged in return: "Yes; I simply followed Grote and Dyar in my statements regarding your divisions of the genus *Agrotis*." And Mr. Dyar, I have no doubt, simply followed Mr. Grote! Now, I would not be understood as questioning for a moment the divine right of a critic to condemn without reading or understanding the work criticised, or to impute views to suit himself; but I must confess that I am inclined to have more regard for comments when the criticism indicates an understanding of the author's actual position. But perhaps this is merely a prejudice on my part!

Yet it is something of a surprise that Mr. Grote's statements concerning my work or views should find unquestioned acceptance anywhere. When any of my papers are under his consideration, condemnation is nearly always certain, and Mr. Grote is always a much-abused individual. If the facts do not bear out the desired conclusion, why so much the worse for the facts. For instance, we find in the CAN. ENT. for 1894, Vol. XXVI., pp. 82 and 83, the following plaint:—"Prof. Smith goes still further. He suppresses my reference of the species described by Moeschler as *islandica* to *opipara*, in 1892, as cited above, and has the courage to write, 'the error is Mr. Grote's for condemning Mr. Morrison's species on insufficient grounds!'. By also suppressing Moeschler's original determination, I am brought in for a synonym I never committed!" If reference is made to my Revision of *Agrotis*, Bulletin No. 38, U. S. Nat. Mus., p. 183, the following will be found: "Mr. Grote was correct in referring *opipara* and *islandica*, Moeschl. (nec Stgr.), as synonymous. The error is Moeschler's in failing to recognize the distinction between the forms, and Mr. Grote's for so positively condemning Mr. Morrison's species on insufficient grounds." How much now remains of Mr. Grote's complaint? If the curious reader will take the trouble to look into the

*The italics are mine. Note the plural. Mr. Grote uses *all* my divisions as subgenera.

literature of the subject, I think he will find Mr. Grote's criticisms on Mr. Morrison's writings and on the species described by him, at least severe enough to justify my statement.

So I am charged with ignoring Mr. Grote's work, and of failing to give him due credit. He writes (Abh. des. n-w Ver. zu Bremen, XIV., p. 16 of separate), after quoting my statement of the bases for subdividing *Agrotis*: "This is only a restatement of my original recommendation. As a matter of fact, throughout Smith merely applies rigorously the structural characters pointed out *by me* long before, and which I lacked time and material to ascertain in the case of each species. In this same paper I say: 'Subdivisions of the genus can be undertaken when the form of the genitalia is studied. This character, taken in connection with the antennal structure, will give us subgenera and assist in the identification of our numerous species.' This is precisely what Smith gives us after a lapse of seven years, and without making proper mention of *my initiatory work*. *He follows my lead as if I had not pointed out the way.*"* Mr. Grote is quite right in the statement that I gave him no credit for the characters used by me, and this is simply because they were not in any sense of the word original with him. Lederer used them in his work on the European Noctuids, so long ago as 1857, and so many other writers, antedating Mr. Grote, used them, that they long since became common or universal knowledge. I made no claim to originality in their use, and concede none to Mr. Grote. I made a bald statement of the characters employed; nothing more. I do claim originality, however, for the use of the claspers instead of the side-pieces (harpes) alone. Lederer used the latter only, and Mr. Grote nowhere went further than Lederer.

Mr. Slingerland questions also whether we shall use *Feltia* or *Agronoma*, because Mr. Grote asserts that the two are synonyms and the latter, with *vestigialis* as type, antedates *Feltia*. Mr. Slingerland failed to find material in Mr. Grote's writings to determine the matter and, quite correctly, does not accept his bald statement as decisive. I gave in my Revision (p. 109), under *Feltia*, the following: "The distinctive characters of the species grouped under the present term are, spinose and quite heavily armed fore tibiae; protuberant, rough front, pectinated or serrate antennae, usually wide wings with dark colours and a tendency to

*The italics are mine.

a radiate type of maculation." Mr. Grote, writing from Europe, of a common European species, presumably had specimens at hand for examination, and to the scientific student it would seem as if a clinching argument could be presented in the simple statement that *vestigialis* presented just these structural characters. But except for a reference to the maculation, such a statement is carefully avoided! It may be added, indeed, that in nearly every case where Mr. Grote has replaced a generic name proposed by me by an "earlier" term, he gives no structural characters to sustain his point. It is loose assertion merely. I found in the Martindale collection at the Ac. Nat. Sci. of Philadelphia, a good pair of *vestigialis*; through the courtesy of Mr. E. L. Graef, of Brooklyn, N. Y., I obtained another pair; and from the U. S. National Museum I obtained two additional males, by the kindness of the officials in charge. I compared these carefully with the descriptions of the species accessible to me, that no reasonable doubt might exist as to their identity and then found, as I had expected from Mr. Grote's silence, that there is no protuberant, rough front, and there are no heavily armed fore tibiae! The species belongs to *Agrotis* as restricted by me. If, as Mr. Grote states, *vestigialis* is the type of *Agronoma*, this name can never replace *Feltia*, with *ducens* (*subgothica*) as type, whether we use it in a generic or sub-generic sense. I have absolutely no prejudice in favour of any of the generic names adopted or proposed by me, and am ready to suppress any or all of them in favour of others previously used. I ask only that there shall be a scientific demonstration of their identity; not merely a loose statement without facts given to support it. Lepidopterists have been too long looked upon as triflers rather than as students, because of this very lack of scientific accuracy in their work; but I am happy to say that to the more recent writers, including the Messrs. Slingerland and Dyar, this reproach cannot be made. With the beginning of a Scientific study, structural characters are discovered in all stages that upset our previous notions, and the classification of the order is therefore in an unsettled condition. I believe that it will remain so for some time to come; but every accurate contribution adds clearness, and while their novelty may induce the placing of too much stress upon newly discovered facts, they will, eventually, be fitted into their proper places.

Now, concerning the term *Noctuidæ* which Mr. Grote proposes to replace by *Agrotidæ*! He says: "The family name *Agrotidæ* is proposed instead of the usual term *Noctuidæ* since the generic title *Noctua*

is preoccupied" (Abh. Naturw. Ver. Brem., XIV., p. 1 of separate), and again (l. c., p. 21): "The term *Noctua*, used by authors for this section, is, as I understand the matter, preoccupied in the Birds and, according to the rules, cannot be used a second time in Zoology." Again no facts are given, and again Mr. Dyar repeats, CAN. ENT., XXVII., 225, "The name *Agrotidæ* is proposed for the customary *Noctuidæ*, as the term *Noctua* is preoccupied in Birds." Mr. Dyar thus seems to accept the change and repeats, as a fact, Mr. Grote's positive statement that the name is preoccupied. It may be so; these gentlemen may have information not accessible to me, and in order to bring it out I state my own knowledge as follows:—

In Scudder's "Nomenclator" we find

Noctua, Klein, Moll., 1753,

Noctua, Fabr., Lep., 1776,

Noctua, Sav., Aves., 1809,

Noctua, Linn., Lep., 1758.

In the Century Dictionary, that marvellous storehouse of terms, the same order is observed: (*a*) an old genus of Mollusca, Klein, 1751; the date here differing from Scudder; (*b*) a genus in Lepidoptera, and (*c*) a genus of Owls by Savigny in 1809.

I cannot find in any dictionary of Ornithology any earlier use of the term *Noctua*, though this of course does not prove that there is none.

Noctua, Klein, 1751 or 1753, is certainly the earliest use of the term; but here we run up against the following:

"Canon XII.—The Law of Priority begins to be operative at the beginning of Zoological nomenclature."

"Canon XIII.—Zoological nomenclature begins at 1758, the date of the Xth edition of the 'Systema Naturæ' of Linnæus."

We find that the term *Noctua* was used for the Lepidoptera in the very publication with which Zoological nomenclature begins, although *Noctua* as a generic term in the order is to be credited to Fabricius.

It is possible, of course, that some publications exist, which were overlooked by the authorities cited by me; but if this is so, Mr. Grote certainly owes it to Zoological Science at large to refer to them, and to give the reasons for rejecting *Noctua* as a term "preoccupied in the Birds."

LIST OF HYMENOPTERA TAKEN AT SUDBURY, ONT.

BY JOHN D. EVANS, TRENTON, ONT.

In the following list 283 species are enumerated, 34 not determined specifically, and there are 8 species unknown, making a total of 325 species. I am much indebted to Mr. W. H. Harrington for his very great kindness and valued assistance in identifying these insects.

Collecting was also done in some of the other orders, viz.: Diptera, Orthoptera, and Neuroptera; more especially in the first mentioned, in which many fine specimens were taken, and await determination:—

<i>Cimbex americana</i> , <i>Leach</i> .	<i>Strongylogaster longulus</i> , <i>Nort</i> .
=var. 10-maculata, <i>Leach</i> .	" <i>pinguis</i> , <i>Nort</i> .
<i>Trichosoma triangulum</i> , <i>Kirby</i> .	" <i>soriculatus</i> , <i>Prov</i> .
<i>Hylotoma clavicornis</i> , <i>Fab</i> .	" <i>terminalis</i> , <i>Say</i> .
" <i>McLeayi</i> , <i>Leach</i> .	<i>Pœcilostoma albosecta</i> , <i>Prov</i> .
" <i>scapularis</i> , <i>Klug</i> .	<i>Tenthredo mutans</i> , <i>Nort</i> .
<i>Priophorus æqualis</i> , <i>Nort</i> .	" <i>rufipes</i> , <i>Say</i> .
<i>Nematus aureopectus</i> , <i>Nort</i> .	" <i>semirubra</i> , <i>Nort</i> .
" <i>inquilinus</i> , <i>Walsh</i> .	" <i>signata</i> , <i>Nort</i> .
" <i>lateralis</i> , <i>Nort</i> .	" <i>verticalis</i> , <i>Say</i> .
" <i>luteotergum</i> , <i>Nort</i> .	<i>Tenthredopsis delta</i> , <i>Prov</i> .
" <i>malacus</i> , <i>Nort</i> .	" <i>Evansii</i> , <i>Hargtn</i> .
" <i>placentus</i> , <i>Nort</i> .	<i>Lophyrus abietis</i> , <i>Harr</i> .
" <i>rufocinctus</i> , <i>Hargtn</i> .	" <i>Lecontei</i> , <i>Fitch</i> .
" <i>ventricosus</i> , <i>Klug</i> .	<i>Lyda fascipennis</i> , <i>Cress</i> .
" <i>violaceipennis</i> , <i>Nort</i> .	" <i>pallimacula</i> , <i>Nort</i> .
<i>Harpiphorus maculatus</i> , <i>Nort</i> .	<i>Oryssus Sayi</i> , var. <i>affinis</i> , <i>Harr</i> .
<i>Dolerus aprilus</i> , <i>Nort</i> .	<i>Xiphydria Provencheri</i> , <i>Cress</i> .
" <i>arvensis</i> , <i>Say</i> .	<i>Urocerus albicornis</i> , <i>Fab</i> .
" <i>bicolor</i> , <i>Beauv</i> .	" <i>caudatus</i> , <i>Cress</i> .
" <i>sericeus</i> , <i>Say</i> .	" <i>cyaneus</i> , <i>Fabr</i> .
<i>Monophadnus rubi</i> , <i>Harr</i> .	" <i>flavicornis</i> , <i>Fabr</i> .
<i>Macrophya albomaculata</i> , <i>Nort</i> .	" <i>nigricornis</i> , <i>Fabr</i> .
" <i>epinota</i> , <i>Say</i> .	<i>Figites impatiens</i> , <i>Say</i> .
" <i>flavicoxæ</i> , <i>Nort</i> .	<i>Aulacus rufitarsis</i> , <i>Cress</i> .
" <i>trisyllaba</i> , <i>Nort</i> .	<i>Fœnus incertus</i> , <i>Cress</i> .
<i>Pachyprotasis omega</i> , <i>Nort</i> .	" <i>tarsatorius</i> , <i>Say</i> .
<i>Taxonus</i> , <i>Sp</i> .	<i>Ichneumon brevipennis</i> , <i>Cress</i> .

<i>Ichneumon canadensis</i> , <i>Cress.</i>	<i>Phygadeuon rotundiceps</i> , <i>Prov.</i>
" <i>cincticornis</i> , <i>Cress.</i>	" <i>rubrocinctus</i> , <i>Prov.</i>
" <i>cœruleus</i> , <i>Cress.</i>	" sp.
" <i>comes</i> , <i>Cress.</i>	" sp.
" <i>comptus</i> , <i>Say.</i>	<i>Cryptus extrematis</i> , <i>Cress.</i>
" <i>duplicatus</i> , <i>Say.</i>	" <i>robustus</i> , <i>Cress.</i>
" <i>grandis</i> , <i>Brullé.</i>	" <i>rufoannulatus</i> , <i>Prov.</i>
" <i>Grotei</i> , <i>Cress.</i>	" n. sp.
" <i>inconstans</i> , <i>Cress.</i>	<i>Linoceras Cloutieri</i> , <i>Prov.</i>
" <i>instabilis</i> , <i>Cress.</i>	<i>Hemiteles mandibularis</i> , <i>Prov.</i>
" <i>munificus</i> , <i>Cress.</i>	<i>Ophion bilineatum</i> , <i>Say.</i>
" <i>navus</i> , <i>Say.</i>	" <i>macrurum</i> , <i>Linn.</i>
" <i>nuncius</i> , <i>Cress.</i>	" <i>purgatum</i> , <i>Say.</i>
" <i>parvus</i> , <i>Cress.</i>	<i>Exochilum nigrum</i> , <i>Prov.</i>
" <i>rubicundus</i> , <i>Cress.</i>	" <i>occidentale</i> , <i>Cress.</i>
" <i>rufiventris</i> , <i>Brullé.</i>	<i>Anomalon anale</i> , <i>Say.</i>
" <i>similaris</i> , <i>Prov.</i>	" <i>semirufum</i> , <i>Nort.</i>
" <i>subcyaneus</i> , <i>Cress.</i>	<i>Opheltes glaucopterus</i> , <i>Linn.</i>
" <i>trizonatus</i> , <i>Prov.</i>	<i>Paniscus albovariegatus</i> , <i>Prov.</i>
" <i>vecors</i> , <i>Cress.</i>	" <i>geminatus</i> , <i>Say.</i>
" <i>versabilis</i> , <i>Cress.</i>	<i>Campoplex diversus</i> , <i>Nort.</i>
" sp.	" <i>laticinctus</i> , <i>Cress.</i>
" n. sp.	" <i>vicinus</i> , <i>Prov.</i>
<i>Amblyteles expunctus</i> , <i>Cress.</i>	" <i>alius</i> , <i>Nort.</i>
" <i>nubivagus</i> , <i>Cress.</i>	" sp.
" <i>ormenus</i> , <i>Cress.</i>	<i>Limneria Guignardi</i> , <i>Prov.</i>
" <i>stadaconensis</i> , <i>Prov.</i>	" <i>parva</i> , <i>Prov.</i>
" <i>subrufus</i> , <i>Cress.</i>	" <i>rufipes</i> , <i>Prov.</i>
" <i>suturalis</i> , <i>Say.</i>	" sp.
<i>Phæogenes orbus</i> , <i>Prov.</i>	" sp.
" <i>tuberculifer</i> , <i>Prov.</i>	" sp.
<i>Ischnocerus</i> ? sp.	" n. sp.
<i>Nematopodius</i> , sp.	<i>Pyracmon macrocephalum</i> , <i>Prov.</i>
<i>Phygadeuon acaudus</i> , <i>Prov.</i>	<i>Mesochorus</i> , sp.
" <i>indistinctus</i> , <i>Prov.</i>	<i>Exetastes rufofemoratus</i> , <i>Prov.</i>
" <i>fusiformis</i> , <i>Prov.</i>	" sp.
" <i>jocosus</i> , <i>Prov.</i>	<i>Banchus borealis</i> , <i>Cress.</i>
" <i>nitidulus</i> , <i>Prov.</i>	" <i>canadensis</i> , <i>Cress.</i>

<i>Banchus flavescens</i> , <i>Cress.</i>	<i>Lampronota americana</i> , <i>Cress.</i>
" <i>flavovariegatus</i> , <i>Prov.</i>	" <i>parva</i> , <i>Cress.</i>
<i>Mesoleptus canaliculatus</i> , <i>Prov.</i>	" <i>punctulata</i> , <i>Cress.</i>
" <i>sp.</i>	" <i>varia</i> , <i>Cress.</i>
" <i>sp.</i>	" <i>sp.</i>
<i>Megastylus</i> , n. sp.	<i>Meniscus scutellaris</i> , <i>Cress.</i>
<i>Mesoleius submarginatus</i> , <i>Cress.</i>	<i>Phytodietus vulgaris</i> , <i>Cress.</i>
" <i>sp.</i>	<i>Euxorides americanus</i> , <i>Cress.</i>
<i>Tryphon americanus</i> , <i>Cress.</i>	<i>Xylonomus stigmapterus</i> , <i>Say.</i>
" <i>pediculatus</i> , <i>Prov.</i>	Lept. " <i>canadensis</i> , <i>Hargtn.</i>
" <i>seminiger</i> , <i>Cress.</i>	<i>Odontomerus mellipes</i> , <i>Say.</i>
<i>Euceros Couperii</i> , <i>Cr.</i>	" <i>canadensis</i> , <i>Prov.</i>
<i>Polyblastus annulipes</i> , <i>Cress.</i>	" n. sp.
<i>Cteniscus clypeatus</i> , <i>Cress.</i>	<i>Echthrus abdominalis</i> , <i>Cress.</i>
<i>Exyston clavatus</i> , <i>Cress.</i>	" <i>niger</i> , <i>Cress.</i>
<i>Exochoides borealis</i> , <i>Cress.</i>	" <i>rufopedibus</i> , <i>Hargtn.</i>
<i>Exochus atrocoxalis</i> , <i>Cress.</i>	<i>Bracon dissitus</i> , <i>Cress.</i>
" <i>lævis</i> , <i>Cress.</i>	" <i>obliquus</i> , <i>Prov.</i>
<i>Bassus orbitalis</i> , <i>Cress.</i>	" n. sp.
" <i>pulchripes</i> , <i>Prov.</i>	<i>Rhogas abdominalis</i> , <i>Cress.</i>
<i>Coleocentrus Pettitii</i> , <i>Cress.</i>	" <i>terminalis</i> , <i>Cress.</i>
<i>Arotes formosus</i> , <i>Cress.</i> var.	<i>Apanteles cinctus</i> , <i>Prov.</i>
<i>Rhyssa persuasoria</i> , <i>Linn.</i>	<i>Agathis liberator</i> , <i>Brullé.</i>
<i>Thalessa atrata</i> , <i>Fab.</i>	<i>Microdus annulipes</i> , <i>Cress.</i>
<i>Ephialtes gigas</i> , <i>Walsh.</i>	<i>Meteorus vulgaris</i> , <i>Cress.</i>
" <i>pygmæus</i> , <i>Walsh.</i>	<i>Gymnoscelus pedalis</i> , <i>Cress.</i>
" <i>tuberculatus</i> , <i>Four.</i>	<i>Macrocentrus mellipes</i> , <i>Prov.</i>
<i>Pimpla conquisitor</i> , <i>Say.</i>	<i>Leucospis affinis</i> , <i>Say.</i>
" <i>4-cingulata</i> , <i>Prov.</i>	<i>Eurytoma auriceps</i> , <i>Walsh.</i>
" <i>inquisitor</i> , <i>Say.</i>	<i>Isosoma</i> , sp.
" <i>novita</i> , <i>Cress.</i>	<i>Monodontomerus montivagus</i> ,
" <i>Ontario</i> , <i>Cress.</i>	<i>Ashm.</i>
" <i>pedalis</i> , <i>Cress.</i>	<i>Perisemus prolongatus</i> , <i>Prov.</i>
" <i>tenuicornis</i> , <i>Cress.</i>	<i>Proctotrypes rufigaster</i> , <i>Prov.</i>
" <i>sp.</i>	" <i>longiceps</i> , <i>Ashm.</i>
<i>Polysphincta texana</i> , <i>Cress.</i>	<i>Pteromalina</i> , sp.
" <i>sp.</i>	<i>Platygaster aphidis</i> , <i>Ashm.</i>
<i>Cylloceria occidentalis</i> , <i>Cress.</i>	<i>Cleptes insperata</i> , <i>Aaron.</i>

- Omalus læviventris*, *Cress.*
Hedychrum violaceum, *Brullé.*
Chrysis hilaris, *Dahlb.*
Camponotus herculeaneus, *Linn.*,
 var. *pictus*, *Foul.*
Camponotus marginatus, *Latr.*
Formica sanguinea, *Latr.*
Myrmica, sp.
Sapyga maculata, *Prov.*
 " *Martini*, *Smith.*
Pompilus albosignatus, *Prov.*
 " *cylindricus*, *Cress.*
 " *hyacinthinus*, *Cress.*
 " *marginatus*, *Say.*
 " *maurus*, *Cress.*
 " *philadelphicus*, *Cress.*
 " *virginiensis*, *Cress.*
 " sp.
Agencia pulchripennis, *Cress.*
Priocnemis alienatus, *Smith.*
Ceropales fraterna, *Smith.*
Ammophila communis, *Cress.*
 " *luctuosa*, *Smith.*
 " *vulgaris*, *Cress.*
Sphex apicalis, *Harr.*
Astata unicolor, *Say.*
Hoplisus atricornis, *Pack.*
 " *ephippiatus*, *Pack.*
 " *phaleratus*, *Say.*
Cerceris nigrescens, *Smith.*
Mimesa basirufa, *Pack.*
Cemonus inornatus, *Say.*
Pemphredon concolor, *Say.*
Passalecus mandibularis, *Cress.*
Trypoxylon frigidum, *Smith.*
Crabro ater, *Cress.*
 " *chrysarginus*, *St. Farg.*
 " *cubiceps*, *Pack.*
Crabro interruptus, *St. Farg.*
 " *maculipennis*, *Fabr.*
 " *oblongus*, *Pack.*
 " *producticollis*, *Pack.*
 " *sex-maculatus*, *Say.*
 " *villosifrons*, *Pack.*
 " sp.
Thyreopus advenus, *Smith.*
 " *coloradensis*, *Pack.*
 " *latipes*, *Smith.*
Eumenes fraternus, *Say.*
Odynerus albomarginatus, *Sauss.*
 " *albophaleratus*, *Sauss.*
 " *canadensis*, *Sauss.*
 " *capra*, *Sauss.*
 " *catskillensis*, *Sauss.*
 " *debilis*, *Sauss.*
 " *leucomelas*, *Sauss.*
 " *philadelphie*, *Sauss.*
Polistes pallipes, *Lepell.*
Vespa maculata, *Fab.*
 " *scelesta*, *McFarland.*
 " *vulgaris*, *Linn.*
 " sp.
Colletes americana, *Cress.*
Prosopis affinis, *Smith.*
 " *basalis*, *Smith.*
Sphecodes dichroa, *Smith.*
 " *falcifer*, *Patton.*
Halictus albitarsis, *Cress.*
 " *constrictus*, *Prov.*
 " *coriaceus*, *Smith.*
 " *ligatus*, *Say.*
 " *pilosus*, *Smith.*
 " *scabrosus*, *Prov.*
 " sp.
 " sp.
 " sp.

<i>Augochlora purus</i> , Say.	<i>Megachile consimilis</i> , Cress. ?
<i>Andrena frigida</i> , Smith.	" <i>grandis</i> , Cress.
" <i>hirticeps</i> , Smith.	" <i>melanophæa</i> , Smith.
" <i>nivalis</i> , Smith.	" <i>optiva</i> , Cress.
" <i>vicina</i> , Smith.	" <i>pugnata</i> , Say.
" sp.	" <i>simplex</i> , Prov.
<i>Calliopsis æstivalis</i> , Prov.	<i>Melissodes rustica</i> , Say.
<i>Nomada americana</i> , Kirby.	<i>Anthophora bomboidea</i> , Kirby.
<i>Epeolus mercatus</i> , Fab.	<i>Clisodon terminalis</i> , Cress.
<i>Cœlixys alternata</i> , Say ?	<i>Apathus Ashtonii</i> , Cress.
" <i>tristis</i> , Cress. ?	<i>Bombus borealis</i> , Kirby.
<i>Osmia buconis</i> , Say.	" <i>consimilis</i> , Cress.
" <i>bucephala</i> , Cress.	" <i>fervidus</i> , Fab.
" <i>frigida</i> , Smith.	" <i>lacustris</i> , Cress. ?
" <i>lignaria</i> , Say.	" <i>ternarius</i> , Say.
" <i>simillima</i> , Smith.	" <i>terricola</i> , Kirby.
<i>Monumetha borealis</i> , Cress.	" <i>virginicus</i> , Linn.
<i>Anthidium simile</i> , Cress.	

THE MEDITERRANEAN FLOUR MOTH, EPHESTIA KUEHNIELLA, ZELLER, STILL IN CANADA.

The determined and energetic fight carried on by the miller, the entomologist, and the Local Government in 1889, to stamp out this destructive mill pest in Ontario, is too fresh in the memory of those who witnessed that outbreak to warrant a repetition of the particulars. Suffice it to say that the flour moth is still very abundant in certain Canadian mills. I have received it recently in flour sent me direct from a milling firm in Valleyfield, Quebec, with an urgent appeal for help. The mill has been obliged to shut down several times during the present year to clean out the enormous accumulations of matted flour and webs in the spouts and elevator legs. The mill is a new one and has been running a very short time. It is said the pest came from a neighboring firm. My experience with this moth in California and other places convinces me that it is the worst pest millers have to combat, and this note should be a signal warning to all those interested in the milling business. I have also recently discovered the same pest in Southwestern New York State, where it has done considerable mischief this year, and is still spreading. It has occasioned much loss on the Pacific Coast also the present season. If something is not done to arrest and destroy this advancing enemy in the United States and Canada, I predict very serious results to the milling industries of both countries.

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ASPIDIOTUS PERNICIOSUS, COMSTOCK, AND AONIDIA FUSCA,
MASKELL: A QUESTION OF IDENTITY OR VARIATION.

BY W. M. MASKELL, WELLINGTON, NEW ZEALAND.

In the "Report of the Entomologist of the United States Department of Agriculture for the year 1880," Professor Comstock described (p. 304) an extremely injurious insect of the family Coccidæ, to which he gave the name *ASPIDIOTUS PERNICIOSUS*, or "the pernicious scale," and he stated that this insect attacked a very large number of deciduous fruit-trees in California, "excepting peach, apricot, and black tartarean cherry." Later, this pest was observed, described and discussed by many persons interested in horticulture, and in America it is generally known by the trivial name of "the San José scale," and is looked on as a most troublesome thing.

An article in "Insect Life," Vol. VI., No. 5, September, 1894, contains much information relative to this insect, and its occurrence in various places in America since 1880. Here and there the scale appears to have been found on peach, but only in small quantity; the principal victims are pear, plum, Japanese plum, apple, currant, etc., and most especially pear. In a subsequent article ("Insect Life," Vol. VII., No. 2, p. 165) the same trees are mentioned, with the addition of Japanese quince, and elm (American?). Again, in the same publication (Vol. VII., p. 285) the pear is given as the chief victim of this scale.

In the Agricultural Gazette, of New South Wales, September, 1892, p. 698, Mr. A. S. Olliff reports *ASP. PERNICIOSUS* in Australia on pear.

In September, 1894, I received from Mr. French, of Melbourne, some twigs of peach trees thickly covered with a scale which, in my paper on Coccidæ (read November, 1894; published in Transac. New Zealand Institute, Vol. XXVII.), I identified as belonging to the genus *AONIDIA*, and named *AON. FUSCA*.

In March, 1895, the same gentleman sent me some apple twigs with many scales, which I found to be *ASPIDIOTUS PERNICIOSUS*.

Finally, in July, 1895, Mr. Olliff sent me twigs of pear, peach, and apple, from New South Wales, much infested by *ASPIDIOTUS PERNICIOSUS*.

It was whilst examining these last specimens that the characters which I observed in the adult females led me to compare them closely with those of *AONIDIA FUSCA*, and, as a result, I cannot help being considerably perplexed.

The opinion which, for many years past, I have persistently advocated, as regards the study of Coccidæ, is that it is always better to base distinctions, where possible, upon anatomical characters of the insects themselves, rather than upon external features of the coverings, waxy or cottony, or otherwise, under which they are sheltered. These coverings may vary so much according to accidental circumstances that I think they should be considered as of secondary, or even less, importance. In the case of the two insects of which I am now treating, I am sorry to say that I did not adhere strictly enough to my own rule. Size, colour, form of the scale, food-plant, and such like things, have been so greatly insisted upon, as I find, in all the accounts of *ASPIDIOTUS PERNICIOSUS*, that I have perhaps attached too much importance to them, and, consequently, it is possible that my identification of *AONIDIA FUSCA* is erroneous.

All the authors who describe *ASP. PERNICIOSUS* give the following characters of it :—

1. The scale is "gray"; the pellicles "yellow or reddish-yellow," "sometimes black."
2. When on twigs, "the wood beneath the bark is stained red"; "the cambium layer of wood is stained purplish"; the "peculiar reddening effect on the skin is a very characteristic feature"; "the cambium layer frequently becomes deep red or purplish"; "if the twig be scraped with the finger-nail, a yellowish oily liquid will appear."
3. The diameter of the female puparium, or scale, is given by Comstock as about one 13th inch. I do not find it in other writers.
4. The principal food-plant, as mentioned above, is the pear; when the peach is mentioned it is only incidentally, or as very slightly attacked.
5. No mention is made by authors of the second female pellicle as being any larger than the adult female.

Now, in all the foregoing characters, the specimens on which I founded my *AONIDIA FUSCA* differ from *ASP. PERNICIOSUS*; and if one might accept as positively final the statement in "Insect Live" (Vol. VIII., p. 289), that "the San José scale differs from all others in the peculiar reddening effect which it produces," then there would be no more to be said; for *AONIDIA FUSCA* produces, as far as I know, no such effect. In size, *A. FUSCA* is much smaller, the female puparium having a diameter of one 35th inch. In colour it is "very dark brown or dull black ;

and again, *A. FUSCA* is decidedly numerous on peach twigs. Lastly, the second female pellicle is larger than the adult insect.

Judging, therefore, by all the external characters (except that of the second pellicle, of which I find no record), *AONIDIA FUSCA* is different from *ASPIDIOTUS PERNICIOSUS*.

But a careful comparison of the adult female insects shows that, with the exception of size, their characters are very similar. My specimens of *ASP. PERNICIOSUS* (originally received from Professor Comstock) average one 25th inch in length; those of *AON. FUSCA* average one 65th inch.

In colour the two agree; also in the absence of any groups of "spinnerets"; also in the terminal lobes, hairs, and indentations of the abdomen. The two last characters are of especial importance; so much so that I am strongly inclined to think that I made a mistake in separating the two insects, at least specifically. The identity of my Australian specimens of *ASPID. PERNICIOSUS* with those from America is absolute; my Australian *AONIDIA* is anatomically very close to both, the principal differences being external.

It remains to discuss the generic character of the comparative dimensions of the adult female and the second pellicle, a character which distinguishes *AONIDIA* from *ASPIDIOTUS*. I have already remarked that I find no notice on this point in any author as to *A. PERNICIOSUS*; but as regards *A. FUSCA* I have no doubt, and I possess a mounted specimen of an adult with the second pellicle still attached, the difference in size being perfectly clear; the pellicle extends all round beyond the adult. Assuming, therefore, that it may be necessary to unite the two insects, and to make *FUSCA* a variety of *PERNICIOSUS* on the ground of anatomical similarity, ignoring the external differences, it will become a question, then, of removing *PERNICIOSUS* from the genus *ASPIDIOTUS* and of attaching it to the genus *AONIDIA*.

It is stated in "Insect Life," Vol. VI., p. 362, that while the origin of *A. PERNICIOSUS* is uncertain, the probability is that it came to America from Japan. I believe that Mr. Koebele is in Japan at present studying the Coccidæ of that country; and he has, perhaps, discovered the native home of this injurious pest. But, in a letter which I received from him a few months ago, he says that the Japanese will not permit any specimens of insects to be sent thence by post; and we must wait till Mr. Koebele himself leaves the country to learn more about this scale. Mr. Benson, of Sydney, however, tells me there have been many fruit trees imported into Australia of late years from Japan.

ON AGROTIS TRITICI, LINN., AB. SUBGOTHICA, HAW., AND
AGROTIS JACULIFERA, GN.

BY J. W. TUTT, F. E. S., LONDON, ENGLAND.

I have read with interest the paper by Mr. Slingerland, CAN. ENT., XXVII., p.p. 301-308, and as my name is occasionally mentioned, I trust to the courtesy of our Editor to allow me to reply.

In the first place, I would premise by suggesting that Mr. Grote had more than the bare statement of mine quoted by Mr. Slingerland on p. 302, and was not guided by that alone. He had, I presume, at least seen my notes in the *Entomologists' Record*, and in *British Noctue and Their Varieties*, Vol. II. These Mr. Slingerland appears to have overlooked.

I would point out to American readers that Haworth called his book *Lepidoptera Britannica*, that he described no species knowingly that were not British, and that the onus of proving that he did so rests on Mr. Slingerland, and those who think with him. I would point out also that although Mr. Grote and Prof. Smith may not "have ever seen the original description of *subgothica*," yet I can assure Mr. Slingerland that I had, and that as Mr. Grote, according to his letter, based "his recent revision on the authority of Mr. Tutt," it matters little whether Mr. Grote saw it or not, for he shifts the onus upon my shoulders.

With regard to the species in dispute, I would refer your readers to the quotation referring to the species Haworth described (*vide*, ante. p. 302), in which Haworth says of the species "Habitat in Anglia valde infrequens."* Now, Mr. Slingerland has to face this point. The American species does not occur in England; the species Haworth describes does occur in England; therefore the species that Haworth describes cannot possibly be the American species, by any laws of logic I know.

As Mr. Slingerland says, "No figure of the insect is given"; therefore the whole value of Haworth's name rests on his description. The first question, it seems to me, is not, "Is there anything in it that does not apply to our American insect?" for thus far we have not come to the possibility of its being American, but rather, "Is there any British insect to which it applies absolutely?" and I say, yes! most decidedly, yes! and the insect to which it applies is one of the endless forms of *Agrotis tritici*.

*This was written in 1810, and Mr. Slingerland does not suggest the possible introduction of American specimens into England until 20 years later.—J. W. T.

Mr. Slingerland evidently does not know our British *Agrotis tritici*; it is outside my brief to go into the protean forms it exhibits, but when I say that my series comprises some 2,500 specimens, which have received something like twenty-five different specific names, and a mere summary of these occupies 15 p.p. in *The British Noctuae and Their Varieties*, your readers will see that Mr. Slingerland is treading on treacherous grounds when he is dealing with the subject, and suggests that British lepidopterists cannot name their own insects, for this is undoubtedly the ultimate conclusion of his line of argument.

Now, it is quite evident from Mr. Slingerland's remarks (p.p. 302-303) that whatever specimens Haworth (before 1810) described his *subgothica* from, Mr. Stephens (1829) did not describe the same specimens, for he described his from specimens obtained from Mr. Raddon, and the specimens were labelled, "near Barnstaple, Devon." Now, I have to add, as a matter of personal knowledge, that the coasts near Barnstaple, Devon, produce *A. tritici* in immense numbers, and I can assure Mr. Slingerland, and all other American entomologists, that I can match exactly the specimens which Stephens figures, and Humphrey and Westwood copy, with undoubted genuine specimens of *Agrotis tritici*, and I quite agree with my friend, Mr. C. G. Barrett, that these figures certainly represent a variety of *tritici*.

We now come to Mr. Slingerland's first move into the mists of probability, and I would suggest to Mr. Slingerland that probability is not critical science. I refer to Wood's figure, reproduced in the plate, fig. 1b. Mr. Slingerland says:—"I think that a glance at the next figure of the insect that appeared, taken, doubtless, from Stephens's specimen,* will remove all doubt as to what insect Stephens tried to represent." I object absolutely to this premise. There is not a scintilla of evidence to warrant such an assertion. We want facts and deductions therefrom. We do not now, three-quarters of a century after publication, want an assertion made as being "doubtless," without a single fact to support it.

Now, "up to 1847," Mr. Slingerland very rightly observes that English Entomologists considered *subgothica* a British insect, and a distinct species. Then Mr. Doubleday stated that "Haworth's insect is evidently simply a variety of either *Agrotis tritici* or *aquilina*. The species described by Stephens is American." Now, it is strange that I had never noticed this reference before, but it fortifies my position. It

*I have referred to this statement in detail farther on.

must be observed that Doubleday was the authoritative link binding the "Stephens" generation with the present, and his independent opinion alone would not have to be lightly passed over. My own conclusion being at one with his as to *subgothica*, Haw., I take as affording one more link in the strong chain of independent evidence that I have been able to collect. On p. 305, Mr. Slingerland says:—"Curiously enough" (had I been he I should have said 'naturally enough'), "the English authors have claimed Haworth's insect as a variety of their *tritici*. Doubleday said it was 'simply a variety of either *tritici* or *aquilina*,' but it was soon restricted to the former in British lists, and it is still considered as such by Mr. Tutt." In Doubleday's time, *Agrotis tritici* and *A. aquilina* were considered as distinct species, but for the last thirty or forty years it has been well known that *aquilina* is simply a local form of *tritici*, and that the two erstwhile supposed species copulate indiscriminately*. The Continental (European) and British Entomologists have long ago deprived it of specific rank. Therefore, Mr. Doubleday's conclusion and mine are identical.

Mr. Slingerland says that "the evidence in support of considering Haworth's *subgothica* as a variety of *tritici* (or *aquilina*) seems to be confined principally to the simple statement of Doubleday, although Tutt intimates that he has seen Haworth's description." This is really too ingenuous. Haworth's *Lepidoptera Britannica* was the hand book of British Lepidoptera, and in the hands of every British collector until the publication of Stainton's *Manual* in 1858. Every British collector had his "Haworth" then, just as everyone has his "Stainton" now, and I can only hope that this statement will be sufficient to brush out any doubtful remnants of the implied suggestion contained in this remarkable paragraph.

I am totally unable to untangle the line of thought in which Mr. Slingerland has got on p. 303 when he writes:—"For many years after this the name *subgothica* rarely appeared in British lists, and only as a variety of *tritici*; it apparently does not occur at all in recent lists. It has never been taken in England, so far as I can find any record since Stephens's time." Evidently, when our leading lepidopterists had worked out the true position of Haworth's *subgothica*, it would disappear

*For purposes of sale British collectors still keep them separate, and some conservative lepidopterists, who believe nothing they do not see themselves, even write of them as being so.—J. W. T.

from the British lists, for, from that time forth, it ceased to exist as a distinct species, and became naturally a synonym of the older name of the same species *tritici*, Linn., unless the list contained varietal names as well as specific, when *subgothica*, Haw., would naturally fall as a variety of *tritici*, Linn. To say that *subgothica*, Haw., has "never been taken in England since Stephens's time" is absurd, and begging the whole question, for dozens are taken every year (from my point of view), whereas if Mr. Slingerland refers to Guenée *jaculifera*, it, of course, never has been taken in England, neither in Stephens's time, before his time, or "since his time."

We come now to the first introduction of the species into American literature, the year 1856, Mr. Slingerland informs us, and then Dr. Fitch applied to an American species the name *subgothica*, Haw. On what grounds Dr. Fitch did this we cannot tell; evidently he did not know of Doubleday's conclusion in 1847, but I will say this—that the general similarity between some examples of the two species, and the small amount of systematic work which had been done in the American *Noctua* in 1856, are more than enough to excuse Dr. Fitch for supposing they were identical; nor do I think that Mr. Slingerland scores a point when he states that "no American writer has seriously questioned the identity of our species with the *subgothica* of Stephens and later English writers, or even with the *subgothica* of Haworth until 1891, when Mr. Grote changed his mind in accordance with the opinion of Mr. Tutt." Can Mr. Slingerland wonder at this? What American entomologist had the slightest knowledge of our British *Noctua*? I will go farther and ask—What American *has*? And now I will execute a bouleversement and ask—What British entomologist knows anything of American *Noctua*? You may answer, Mr. Walker and Mr. Butler; but Mr. Walker's ignorance was notorious, and the present condition of the *Noctua* in the British Museum is sufficient proof that Mr. Butler cannot name the commonest British species. The whole thing is too absurd. The name was never questioned, because there was no one to question it.

Now we come to Doubleday's statement *re* "the species described and figured by Stephens is American," and his explanation that he had "traced all the specimens which he had seen of this species (the one described by Stephens) in collections of British Lepidoptera to one source, and I believe the gentleman who distributed them inadvertently mixed a number of the North American insects with his British ones,"

and goes on with a statement that is utterly damaging to "the gentleman's" veracity, or as to his consummate carelessness; but still the unexplained factor remains, viz., that forms of *A. tritici* identical with that figured by Stephens are in many British collections, that the locality given by Raddon is a *bona fide* one for *A. tritici*, and that at a time when there were fewer collectors and few specimens the form figured may not have been well known to Mr. Doubleday.

Now, let us grant for a moment that the variation of *A. tritici* and *A. jaculifera*, Gn., is so closely parallel; nay, so identical, that two specialists at this group, as I suppose Mr. Slingerland and myself to be, cannot see any difference in certain figures claimed for both species—in other words, that what I have no hesitation in referring to *A. tritici*, he has no hesitation in referring to *A. jaculifera*. What bearing, I would ask, has that on Haworth's description? Haworth was dead, and his work was published years before, and he could have had none of Raddon's specimens. He described, evidently, from perfectly different specimens from those used by Stephens. Therefore, even if Raddon fraudulently deceived Stephens, it is clear that he did not deceive Haworth, and until Mr. Slingerland can show some more definite facts relative to Haworth's *subgothica*, he must excuse us if we refuse to change an opinion held by successive generations of British entomologists, viz., that *subgothica*, Haw., is what Haworth described it as, and verily believed it to be, a British and not an American species, and which no one supposed it to be until Dr. Fitch's introduction of the name in America, for, be it observed, the doubt thrown by Doubleday was not on *subgothica*, Haw., but *subgothica*, Stephens. Mr. Slingerland now touches upon what he evidently considers the clinching part of his argument. He asks: "Is Haworth's *subgothica* the same as Stephens's. Probably Haworth's single type specimen could not now be found, if it exists at all." Mr. Slingerland can take the latter for granted. Haworth's type specimen would have been found years ago were it findable. That being so, we are told we must "depend on the original description and a little circumstantial evidence to settle this point." I have before stated that Doubleday and all British authors for almost a century have known perfectly well that Haworth's description refers to a well-known form of *Agrotis tritici*, and the evidence is in favour of this view, but the "circumstantial evidence" must be examined carefully. Mr. Slingerland says that "Haworth's specimen might easily be one which Mr. Barrett recently found in an old

English collection, made up of specimens obtained from older collections by a Mr. Burney, who was contemporary with—and corresponded with—Haworth and others, and many of whose insects fell into his hands.” Now, Haworth died about 1830; Burney died in 1893, aged 79 years. At the time of Haworth’s death, therefore, Burney was a boy of 16, and his correspondence (if any) with Haworth must have been of the most casual character. Again, Haworth’s insects were sold, and Burney would have remembered had he bought it; but boys of 16 do not, as a rule, affect sale-rooms, and at this time Burney was a boy at school. It is on Haworth’s sale catalogue, Mr. Slingerland says, so Haworth did not give it to Burney as a result of correspondence. Now we come to “the specimen” mentioned by Mr. Barrett. I also saw the specimen—one of the American *jaculifera*. It had no label, no hint of its origin, and it was present with dozens of other *foreign* specimens, with not the slightest claim to be considered British. Two years ago Mr. Burney’s collection was sold. That collection was a marvel. It had been collected just as some men collect “old pots” or “toothpicks.” Everything buyable had been bought, and in England, as elsewhere, you can buy anything if you will only pay enough. There were dozens—nay, hundreds of foreign specimens that he had paid big prices for, and obtained with them a British warranty; many of the insects bore well-known lepidopterists’ names—some bore my own. So gross was the fraud, that I disowned some of the latter in the sale-rooms. The whole collection was a scientific lie from beginning to end, and among the foreign specimens sold—it was not even labelled or suggested as British—was this American specimen of *jaculifera*. What Mr. Dale surmises is quite beside the question; there are hundreds of people in England who can guess—more, perhaps, in America—and when Mr. Dale ventures, without the slightest shred of evidence, to suppose that it “probably came from Mr. Raddon,” his wild guess made of people who lived and died before he was born, helps to cut away the ground from under Mr. Slingerland’s feet, for even if every assumption be made that this was a specimen introduced into Britain with a fraudulent design in 1829 (the date of Stephens’s *Illustrations*), it could not have been the specimen that Haworth described anterior to 1810; and these are the facts on which Mr. Slingerland “believes that the weight of evidence indicates that the *subgothica* of Haworth and Stephens were the same species.” I would only ask, Is this logic, or is it science! if not—what is it?

For a scientific man, Mr. Slingerland must be easily satisfied ; but I would urge again that guesswork is not science. I maintain that Haworth's description of *subgothica* refers word for word to a certain form of *Agrotis tritici*. I maintain that Mr. Slingerland has not brought forward one scintilla of evidence to upset Haworth's statement that his species has its "habitat in Anglia ; I maintain that Mr. Slingerland has not brought forward the ghost of a fact to assume that *subgothica*, Haw., is or is not even identical with *subgothica*, Steph.

With regard to the latter, I must assume that Mr. Slingerland has had at least as much experience with the various forms of *Agrotis jaculifera* as I have had with those of *Agrotis tritici*, and, therefore, that his opinion is as good as mine ; but I still maintain mine, he will maintain his.

Now we come to a matter of expediency. Is it worth while to perpetuate a name about which so much doubt exists? Suppose Mr. Slingerland and myself let our difference die a natural death, the same duel will be fought again and again between our successors, who will view the matter from our respective standpoints.

Now, about Guenée's figure (1d) there can be no doubt. It does not represent any possible form of *Agrotis tritici*. Here, then, is the first unquestioned figure of the American insect. It is the only reasonable name to apply to it, but that is a matter for Mr. Grote and Prof. Smith, and not for me. I simply state facts. *Agrotis tritici*, var. *subgothica*, Haw., is a living fact to me, so is *Agrotis jaculifera*, Gn. For my part I shall continue to write :—

Agrotis tritici, Linn.

ab. *subgothica*, Haw.

2. *Agrotis jaculifera*, Gn.

And Mr. Slingerland can add, if he chooses, to the latter (? *subgothica*, St.). This is what facts warrant, and when we change facts for opinion we are doing a sorry thing for science.

Mr. Slingerland says, p. 303 : " This figure, which is reproduced as 1b on the plate [it is enlarged to natural size], is from Wood's *Index Entomologicus*, pl. 9, fig. 149 (1839). All must admit that it is one of the best figures of our American species ever published." I have compared it carefully with the figure from nature, and mark the differences : Wood's figure (1b) may be the best of the figures of the American species ever published, but it represents equally well many specimens of *A. tritici* in my cabinet, and the question arises how far we are justified in considering these as two distinct species at all ; whilst for two male specimens of the

same species the abdomina are singularly unlike. Indeed, Mr. Slingerland's references to the figures seem remarkably unhappy. for if Wood's figure is one of the best figures of the American insect ever published, it is singularly unlike the figure from nature above it, and to suppose that Wood's figure (1b) and Stephens's (1a) are from the same specimen seems to suggest great incapacity on the part of one of the artists to reproduce what he saw. Figs. 1 and 1d represent nothing British, but for the remainder there is nothing to add.

I would now draw Mr. Slingerland's attention to an important fact that he has altogether overlooked, viz., the connection between Doubleday and Guenée. It is a matter of history that almost all the N. American species Guenée possessed were obtained from Doubleday and Desvignes, and that most of his work was submitted to Doubleday before publication. It was, therefore, with Doubleday's full knowledge that *jaculifera* was described, and I observe that Guenée in his *Histoire, etc. (Noctuelites)*, Vol. V., p. 262, actually described his *jaculifera*, var. B., from specimens in Doubleday's collection. It is quite evident that with the mutual understanding between Doubleday and Guenée, that Doubleday agreed with Guenée's nomenclature of the American species in 1852, and equally certain, in the face of what he had written in 1847, that he considered the species quite distinct from *subgothica*, Haw.

Mr. Slingerland, in his quotation of my note that "I do not know the American *subgothica*," rather misstates my present position. I have examined all the specimens in the British museum repeatedly since 1891, and know well what I am talking about, and his suggestion that I am an "English writer, who does not know the American insect," is rather startling and far-fetched, and would have been more warranted had Mr. Slingerland written his article five years ago.

One other point only interests me in the note, and in that I am pleased to be able to agree with Mr. Slingerland. There is no doubt Guenée's name, *jaculifera*, refers to the insect known as such, that his var. B. must be called *tricolor*, Lintner, and that his var. B. = *herilis*, Grote. It may be interesting as bearing out Mr. Slingerland's position that Guenée probably had no specimens of *jaculifera*, but that he described Desvignes and Doubleday's specimens; that these Entomologists must have had several specimens is pretty evident, for Guenée writes (*Ibid.*, p. 262): "Amerique Septentrionale; Canada Coll. Div. Parait très-commune; whilst of var. B. he specially notes: "Etat de New-Yorck, Coll., Dbday."

I have tried to be explicit even at the risk of offending our Editor by being too verbose. I am afraid even now that I may have to explain doubtful points. At any rate I trust I have been logical enough to convince my two good friends, Prof. Grote and Prof. Smith, that on the score of "scientific truth," as well as on the score of "expediency," it is not well that two distinct species should be known in Europe and America by the same name, and that the true name henceforth for the American species—much as I detest upsetting old associations—must be *Agrotis jaculifera*, Gn.

EXOMALOPSIS, A NEOTROPICAL GENUS OF BEES
IN THE UNITED STATES.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

The genus *Exomalopsis*, Spin., was founded in 1851 on a couple of bees from Para, Brazil. Three years later, F. Smith described three additional species, also from Brazil. More recently, species have been described or recorded from Cuba, Jamaica, and Mexico, but none hitherto from the United States. One species, *E. pulchella*, Cr., has a remarkable range, being found in Cuba (Cresson), Jamaica (Fox), and Lower California (Fox). I myself have taken it in Jamaica.

The species now described has rather an extensive range in the upper Sonoran zone of New Mexico.

Exomalopsis solani, n. sp.—♀ about 8 mm. long, anterior wing about 6 mm. Black, polished, very shiny, pubescence all pale. Head broad, subtriangular seen from the front, eyes narrow; occiput and cheeks fringed with pubescence, silvery-grayish and subappressed on cheeks; erect, duller, and subochraceous on occiput. Vertex bare, but the occipital hairs extend forward behind the ocelli. Front with copious white hairs, seeming to radiate from the antennal sockets; clypeus and labrum with rather thin yellowish pubescence. Antennæ black, the last half of the flagellum becoming rufous; 2nd joint of flagellum equal with 3rd, or, if anything, rather shorter. Mandibles black; 4th and 5th joints of maxillary palpi of equal length, 6th shorter. In another specimen the 4th joint is clearly longer than the 5th. Glossa reddish, the tip obtuse.

Thorax with rather dense pubescence, except the scutellum, hind half of mesothorax, and dorsum of metathorax, which are bare. The dorsal pubescence is dull yellowish-gray, with even a few black hairs immediately behind the scutellum and at the sides of the mesothorax; on the hind border of prothorax is some dense short pale pubescence, showing through the longer hairs. At the sides of the metathorax and on the pleura the pubescence is whitish. The exposed portions of the meso- and metathorax are practically impunctate, but the pleura is very strongly punctured. Tegulæ large, piceous. Wings smoky-hyaline, stigma and nervures piceous; marginal cell long, pointed; 2nd submarginal not half as big as the 1st or 3rd, a little narrowed above; 3rd submarginal narrowed nearly one-half to marginal. Femora and tibiæ black; tarsi rufescent. Pubescence of legs whitish, that of tarsi reddish behind. Tibio-tarsal brush of hind legs very large, the hairs very distinctly plumose,

whitish or dull silky white, not at all gray or black, but rufescent on tarsi beneath. Claws very strongly bifid.

Abdomen short, nearly subglobose ; bases of segments with sparse silky pubescence ; hind margins of segments 2-4 and sides of hind margin of 1st segment with narrow even bands of pure white pubescence, very conspicuous.

Hab —First found at Albuquerque, N. M., not uncommon on flowers of *Solanum elaeagnifolium* between the old and new towns, Aug. 16, 1895. On Oct. 13 I took one at Las Cruces, N. M., on a plant supposed to be *Flaveria*. Specimens were also taken at Las Cruces by Mr. C. Rhodes, on *Verbesina encelioides* and *Bigelovia Wrightii*, early in October.

Curiously, this insect seems to resemble the West Indian types rather than the Mexican. I sent one to Mr. Fox, who remarks that it "differs from any in our collection by the narrow, continuous, white fasciæ of abdomen, which are more regular than in the related species. From *pulchella* and *similis* it differs by the apparently unicolorous pubescence of hind tibiæ, and again from *similis* by the dorsulum being polished and impunctate medially." The Mexican species nearly all have black pubescence.

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The annual subscription (\$1), now due, should be sent to the Treasurer, J. A. Balkwill, Victoria Hall, London, to whose order money orders or drafts should be made payable.

BOOK NOTICES.

A HAND-BOOK OF BRITISH LEPIDOPTERA, by Edward Meyrick, B. A., F.Z.S., F.E.S., assistant master at Marlborough College. London: MacMillan & Co., and New York, 1895

This book of 843 pages, illustrated by 104 cuts of venation, describes all the British species of Lepidoptera, 2,061 in number, with descriptions of the genera, families and superfamilies. Full synoptic tables are given, leading down to the separation of species. For the recognition of species, for which it is intended, the work seems admirably adapted. A brief notice of the larva of each species is given, but not enough for identification. What is said, however, is useful and also serves to indicate those species whose life-history is still imperfectly known. The work on the imagoes is stated to be the result of the author's independent observation, but the larval descriptions are compiled. No species are figured. The nomenclature, especially of the higher groups, is occasionally unsatisfactory. There is no synonymy and no references to literature, so that some of the family names are meaningless till after a careful examination of the species included. Some of the changes seem arbitrary and contrary to the rules of priority; e. g., where the Thyatiridæ are called "Polyplocidæ," and the Eucleidæ (= Limacodidæ), "Heterogeneidæ," without any explanation. The spelling of the family names does not conform to the general present custom. A few new genera are described among the Tineids.

The most original and most interesting part of the book is the classification of the Lepidoptera into superfamilies. It differs from any hitherto presented, but is strictly on the lines laid down by recent workers as reviewed by Mr. Tutt (Trans. Ent. Soc., London, 1895, p. 343). Nine superfamilies are created, the lowest, the "Micropterygina," correspond-

ing exactly to Prof. Comstock's Jugatæ, although not elevated to the rank of a suborder. I reproduce the classification in full, adding, in brackets, certain explanations of the family terms.

1. CARADRININA.

Arctiadae [=Sarrothripus, Cymbidae, Lithosiidae, Nolidæ, and Arctiidae].

Caradrinidae [=Noctuidæ with vein 5 of secondaries weak, and Apatelidae].

Plusiadae [=the other Noctuidæ].

Ocneriadae [=Lymantriidae and Colocasia (Demas)].

2. NOTODONTINA.

Hydriomenidae
Sterrhidae
Geometridæ
Monocteniidae
Selidosemidæ

[= Geometridæ and
Brepidae].

Polyplocidae [=Thyatridae].

Sphingidae

Notodontidae.

Saturniidae.

3. LASIOCAMPINA.

Drepanidae.

Endromidae.

Lasiocampidae.

4. PAPILIONINA.

Nymphalidae.

Satyridæ.

Erycinidae.

Lycænidæ.

Pieridae.

Papilionidae.

Hesperidae.

5. PYRALIDINA.

Phycitidae.

Galleriidae.

Crambidae.

Pyraustidae.

Pyralididae.

Pterophoridae.

Orneodidae.

6. PSYCHINA.

Psychidae.

Zeuzeridae [=part of Cossidae].

Zygaenidae [=Anthroceridae].

Heterogeneidae [=Eucleidae].

7. TORTRICINA.

Epiblemidæ.

Tortricidae.

Phalonidae.

Trypanidae [=part of Cossidae].

8. TINEINA.

Aegeriidae [=Sesiidae].

Gelechiidae.

Oecophoridae.

Elachistidae.

Plutellidae.

Tineidae.

9. MICROPTERYGINA.

Hepialidae.

Micropterygidae.

It appears that the superfamilies 5 to 8 correspond to my Tineides, 4 to the Papilionides, 1 to 3 to the Agrotides with the exception of two families under the "Notodontina," the Sphingidae and Saturniidae, which

I consider as of superfamily rank. With the exception of these two unwarranted (as I think) associations, there seems little fault to find with the classification. I will leave to Mr. Grote the correction of the family and superfamily names, as he has paid especial attention to the determination of types, and the effects of the application of priority rules. The importance of such work is made very evident by Mr. Meyrick's book, if we are ever to have a uniform and stable nomenclature.

It is evident now that Lepidopterists are practically agreed on the general classification of the Frenatæ. As to the exact limits of superfamily groups, there is yet, unfortunately, scarcely an approach toward agreement.

HARRISON G. DYAR.

THE CAMBRIDGE NATURAL HISTORY, Vol. V. *Peripatus*, by Adam Sedgwick, M.A., F.R.S., etc.; *Myriapods*, by F. G. Sinclair, M.A.; *Insects*, Part I., by David Sharp, M.A. (Cantab.), M.B. (Edinb.), F.R.S. Macmillan & Co., London, and New York, 1895.

Under this title has been given to the public a work which bears out in every way the deservedly high reputation of the writers. From its style of treatment of the subject, the book may be read with pleasure and profit by general student and specialist alike, while to the instructor who wishes to bring before his pupils the results of late researches, though out of reach of large libraries, it will prove a most valuable aid.

The chapter on *Peripatus*, by Mr. Sedgwick, is in itself a model memoir, and the twenty-six pages devoted to the curious creature are made up for the most part of original studies by the author, who has previously published important monographs on this subject. The historical and morphological matter, which is fully illustrated by fine figures, is followed by a synopsis of all the known species, with notes on their differential characters and geographical distribution—the map which forms the frontispiece of the volume showed them to be confined to the region south of the Tropic of Cancer. The discussion of the affinities of *Peripatus* to the Arthropoda and Annelida is of great interest to the zoologist, whatever his beliefs in regard to the theory of descent.

From Mr. F. G. Sinclair we have the chapter on *Myriapoda*. The preliminary account of these animals contains some charmingly written notices of their habits, and marks the author as a faithful observer in the field as well as in the laboratory. A short sketch of the classification follows, with brief definitions of the families and figures of typical forms,

Several pages which are devoted to the anatomy and embryology of the group, and are embellished by many useful figures, are succeeded by an account of the fossil forms and by a discussion of the zoological position of the class.

Dr. Sharp has taken up the Insecta (Hexapoda) in the third chapter, and nearly five hundred pages are devoted to the general consideration of the subject and a careful review of the Aptera (Thysanura and Collembola) the Orthoptera (inclusive of the Forficulidæ), the Neuroptera (under which name he includes several of the groups given ordinal rank by Brauer, Packard, Comstock, and others) and the lower families of the Hymenoptera. The remainder will follow in future volumes, which the Entomological world will look forward to with much interest. No one who is familiar with the work of the author needs to be assured of its excellence, and it will be sufficient to state that the literary side is fully as well upheld as the scientific. The reader whose knowledge of scientific terms is limited will find that careful attention has been given to making them clear, while the specialist will see that many important points, simply touched upon or slurred over by most text-books and "Natural Histories," are here elaborated by a master hand. The figures of large and bizarre forms of Orthoptera and the accounts in the text of their wonderful adaptation to environment convey a most instructive lesson. A remarkable case of resemblance to an ant is shown by a small Locustid (*Myrmecophana fallax*) which, with a form of body recalling in general that of an ant, is dependent for the "stalk" or pedicel of the abdomen upon a white spot on each side of the body, leaving only a narrow dorsal line dark.

We have not room to speak of all the groups in detail, but mention should be made of the very interesting accounts of the Termites, or white ants. To the inquiring mind, also, the practice of citation of authorities by means of foot-notes must commend itself—this plan being followed throughout the work. The beauty and careful selection of the illustrations deserve special remarks, while the press work is of the best. On the whole, we must consider the enterprise as one meriting the support of every entomologist who cares to see the treatment of his favourites placed in the hands of those competent to properly deal with it and who are able to give us a well-written, thoroughly interesting and reliable guide.

H. F. WICKHAM.

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No. 2.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XIV. THE MELOIDÆ OF ONTARIO AND QUEBEC.

The Canadian species of Meloidæ are few in number, but offer considerable difficulty to the student, chiefly from the fact that some of them are extremely variable in colour and size, while in the genus *Meloe* we meet with a group in which the specific characters have never been accurately determined. The family is characterized by the vesicant or blistering properties of its members (the "Spanish fly" being perhaps the best known in this connection), and, under the name of cantharides, blister-beetles are to be found in every drug store. To the agriculturist they are often a pest, *Macrobasis unicolor* often doing considerable damage to potatoes. The naturalist finds in the curious modifications of the antennæ of the males, a theme worthy of his careful study.



FIG. 1.—Larva of Blistering Beetle.

The larval habits of but few species have been worked out, and these vary somewhat among themselves. The account of the transformations of some European species of *Meloe* has been so often copied in entomological text books that it seems scarcely necessary to reproduce it here. It may be enough to note that the larvæ are hatched as minute six-footed active creatures, which find their way on to the bodies of bees, and are carried in this way into the nests. Here they feed on the provisions and larvæ of the bees, changing their form several times before appearing as pupæ.

Technically, the family characters may be summed up as follows:—

Hind tarsi 4-jointed, the others 5-jointed; anterior coxal cavities open behind. Head strongly narrowed at base into a small neck, front vertical; lateral suture of prothorax entirely obliterated. The base of the prothorax is narrower than that of the elytra, the hind coxæ are large and promi-

nent, and the claws are either cleft or toothed. The chief development of the group in North America is to be found in the regions lying to the westward of the Missouri River and southward of the Platte. Here the species of *Cantharis* and *Pyrota* abound, and, with representatives of several peculiar genera which are unknown in the Eastern districts, give to the fauna a facies which is unmistakable. Some of these Southwestern forms are of considerable size, *Macrobasis longicollis*, Lec., reaching the length of an inch, while *M. atrivittata* is even larger, and is, besides, of great beauty. *Cysteodemus Wislizeni*, Lec., is remarkable on account of its form—the elytra being convex and inflated, giving a comical appearance of obesity to the insect. In colour it is of a bright blue, and a more curious species in most respects does not exist in our fauna.

The genera reported from Canada may be readily separated by the following table:—

Elytra short, overlapping along the suture and leaving most of the abdomen exposed. Wings absent..... *Meloe*.

Elytra long, almost or quite covering the abdomen, not overlapping at suture. Wings usually present.

Second joint of antennæ as long or longer than the third; first joint elongate in the male..... *Macrobasis*.

Second joint of antennæ shorter than the third, usually not more than half as long.

Antennæ not thickened towards the tip, setaceous, usually much longer than the head and thorax. Surface of body not metallic..... *Epicauta*.

Antennæ scarcely longer than the head and thorax, much thickened towards the tip; the outer joints short and broad.

Labrum deeply emarginate at middle... .. *Pomphopæa*.

Antennæ extending beyond base of thorax, the joints bead-like in form; labrum slightly emarginate at middle. Surface of body metallic..... *Cantharis*.

It will be understood that the above characters are not of necessity essential, and that they are intended to apply only to the Canadian forms constituting the genera. Several species of *Cantharis* from other regions are not metallic, and there is a great range of variation in the form of the antennæ. This matter is discussed more fully in Dr. Horn's papers, the titles of which may be found in the bibliography.

MELOE, Linn.

A most difficult genus to treat. The species are clumsy insects with short elytra, which do not cover the large, unwieldy abdomen. They may be found crawling about on low herbage during the cooler portions of the day, or sometimes on flowers; apparently they are most common in autumn and spring. When disturbed they emit a disagreeable fluid from the joints

As one of the species is lacking in our collection, we have applied to Dr. Horn for the synopsis serving to separate the four Canadian forms among themselves.

Thorax evidently longer than wide, sparsely and irregularly punctate.

Elytra rather finely strigose and subopaque; general colour dull blue; head scarcely punctate.....*americanus*, Leach.

Thorax not longer than wide.

General colour black, dull; thorax coarsely punctured and with an impression on basal half of median line.....*impressus*, Kirby.

Blue-black, slightly shining; thorax moderately densely punctate, disk not impressed; elytra not roughly sculptured....*niger*, Kirby.

Decidedly blue and rather shining; thorax very coarsely, deeply, not densely punctured, disk not impressed; elytra rather coarsely sculptured.....*angusticollis*, Say.

MACROBASIS, Lec.

Contains only one Canadian species, *M. unicolor*, Kirby. (Fig. 2.) The body is black, covered with whitish hairs which give an ashen appearance to the insect. The male differs from the female in having the second antennal joint longer than the third and fourth together. Length, .32-.64 in. Often occurs in such numbers on potato vines as to do considerable mischief.

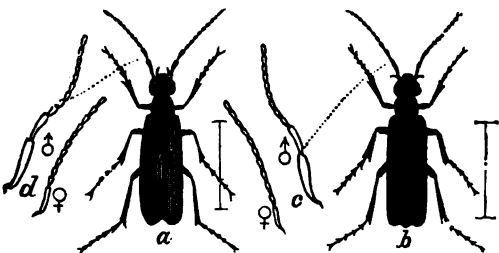


FIG. 2.

EPICAUTA, Redt.

Four species recorded from Canada are included here. They resemble only the preceding genus in form and may be readily separated from it by the antennal characters. In habits they also resemble *Macro-*

basis, being found commonly on flowers or herbage. We have taken *trichrus* on convolvulus, *pennsylvanica* on golden-rod, *ferruginea* on Helianthus, and *vittata* on various low plants along river banks.

Elytra yellowish with two black stripes. .50-.80 in. *vittata*, Fab. (Fig. 3).
Elytra unicolorous, never striped.

Antennæ scarcely tapering to tip, joints nearly cylindrical.

Colour usually black; head in great part red; varies occasionally in being entirely covered with cinereous pubescence; thorax longer than wide, more densely punctured than the head. .30-.50 in. *trichrus*, Pall.

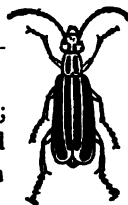


FIG. 3.

Colour ferruginous or cinereous, owing to the dense pubescence; thorax not longer than wide, not differently punctured from the head; antennæ short. .12-.36 in. *ferruginea*, Say.

Antennæ tapering at tip, joints looser and more constricted or narrowed at base.

Black, coarsely pubescent; head and thorax similar in punctuation. .28-.50 in. *pennsylvanica*, DeG.

POMPHOPÆA, Lec.

P. Sayi, Lec., has been reported from the Sudbury district. It is a greenish insect, .60-.70 in. long, with short antennæ which enlarge towards the tip. The legs are reddish-yellow; the knees, tips of tibiae and tarsi, dark.

CANTHARIS, Linn.

Two very fine metallic green or bronzed species belong here. They separate best by the use of secondary sexual characters, as made known by Dr. Horn, thus:—

Fifth abdominal segment of ♂ with a broad emargination, which is bisinuate at bottom; lateral lobes rather prominent. Female with hind trochanter subangulate. .64-1.10 in. *Nuttalli*, Say.

Fifth abdominal segment of ♂ with an acute notch at middle, the lateral lobes broadly rounded. Hind trochanters of ♀ not subangulate. .50-.70 in. *cyanipennis*, Lec.

In both of the above species the hind trochanters of the male are armed with a spine at middle, and by this character they may be separated from *C. viridana*, Lec., which occurs in the Northwest Territory. The males here have the hind trochanters unarmed.

In the further study of the Meloidæ the student will find the following works of value :—

1853. Leconte, J. L. Synopsis of the Meloides of the United States. Proc. Acad. Nat. Sci., Phil., VI.
1866. Leconte, J. L. New Species of North American Coleoptera. Smithsonian Institution. *Pyrota*, p. 159; *Pomphopæa*, p. 160.
1873. Horn, Geo. H. Revision of the Species of Several Genera of Meloidæ of the United States. Proc. Am. Phil. Soc., XIII.
1875. Horn, Geo. H. Synonymical Notes and Descriptions of New Species of North American Coleoptera. *Zonitis*, p. 155. Tr. Am. Ento. Soc., V.
1878. Horn, Geo. H. Contributions to the Coleopterology of the United States, No. 2. *Calospasta*, p. 59. Tr. Am. Ento. Soc., VII.
1880. Leconte, J. L. Short Studies of North American Coleoptera. Trans. Am. Ento. Soc., VIII. *Nemognatha*, p. 212.
1885. Horn, Geo. H. Studies among the Meloidæ. Trans. Am. Ento. Soc., XII.

In addition to the above, a few notes on the smaller genera have been published, and certain portions of various larger ones gone over, but these titles have been omitted for lack of space.

THE NORTH AMERICAN SPECIES OF GNATHODUS.

BY CARL F. BAKER, FORT COLLINS, COLO.

The genus *Gnathodus*, as at present accepted, includes forms closely allied to *Cicadula*, but differing in having only two apical cells in the wing. They are of a weaker build than species of *Cicadula*, and a characteristic appearance from above makes them readily distinguishable from any of that genus. The species are very variable and difficult to define. They are small, more or less slender, greenish, yellowish, or whitish Jassids, usually without distinct markings. The ocelli are distant from the eyes. The clypeus usually somewhat exceeds the genæ. The ovipositor rarely exceeds the pygofer. In the United States at least, most of the species are of very wide distribution.

TABLE OF SPECIES.

- A. Head wider than pronotum; vertex not at all produced; colour very pale sordid greenish-fuscous, elytra whitish-subhyaline, sternum black; length, 3-3.25 mm. *abdominalis*.
- AA. Head narrower than pronotum, often much so.

- B. Sternum green or yellow.
- C. Size medium to small; length, 3-4.25 mm.; vertex not strongly produced.
- D. Elytra whitish-translucent; head and thorax pale olive-green; slender; length, 3.5-4 mm. *impictus*.
- DD. Elytra whitish-subhyaline, greenish to yellow on basal two-thirds; head and thorax yellow or yellowish-green; robust, length, 3.75-4 mm. *impictus*, var. *flavus*, n. var.
- DDD. Elytra pale greenish-hyaline; head and thorax green; slender, length, 4.25 mm. *medius*, n. sp.
- CC. Size large; length, 5 mm.; vertex strongly produced; yellowish throughout, with hyaline elytra. *manitou*.
- BB. Sternum black.
- E. Face at least, and usually vertex, pronotum, and scutel, with distinct fuscous markings.
- F. Elytra not distinctly maculated with black; vertex not produced. *confusus*.
- FF. Elytra more or less strongly marked with black; vertex distinctly produced. *punctatus*.
- EE. Face, vertex, pronotum, and scutellum, greenish, without distinct fuscous markings.
- G. Elytra whitish-translucent throughout; veins narrowly greenish; slender, length, 4.25 mm. *occidentalis*, n. sp.
- GG. Elytra pearly-white, green towards the base; veins broadly green; robust, length, 4.5 mm. *Livingstonii*, n. sp.

Gnathodus abdominalis, VanD.

1892. VanDuzee, CAN. ENT., XXIV., p. 113.

1894. VanDuzee, Trans. Am. Ent. Soc., XXI., p. 307.

1895. Gillette & Baker, Prelim., List Hemip., Colo., p. 104.

1895. Gillette, 7th Ann. Rep. Colo. Exp. Sta., p. 60.

Head wider than pronotum. Face a fourth wider than long. Front two-sevenths longer than wide, two and one-sixth times longer than the clypeus. Clypeus broader at base than at tip, sides subparallel or slightly incurved, tip broadly rounded. Vertex evenly rounded, not produced. Pronotum two and one-eighth times as wide as long, length two and a fourth times that of the vertex, hind margin nearly straight, curvature about half of the length. Ovipositor exceeding the pygofer. Hind margin of the last ventral segment in the female apparently slightly

bisinate. Plate in male evenly rounded; valves narrowly, strongly produced, exceeding the plate by twice its length; tips straight.

Colour pale yellowish-fuscon on the head and thorax, the latter sometimes with three faint longitudinal fuscon stripes. Front more or less washed with rufous. Elytra whitish-subhayline; sternum black. Abdomen above black except margins of segments. Venter yellow. Length, 3 mm.

The above description was prepared from Colorado specimens determined as straight *abdominalis* by Mr. VanDuzee. The distribution of the species in Colorado, as far as determined, is given in Prelim. List Hemip. Colo. In this State it has been recorded from barley and sugar-beet. The species was originally described from New Jersey (Smith). I have before me, also, specimens from the collection of the Ill. State Lab. Nat. Hist., bearing data as follows: June 19, on wheat; July 27; Sept. 17, on wheat.

In the original description, Mr. VanDuzee says of the male genitalia: "Valve large, as long as the two apical ventral segments taken together; apex angled, subacute. Plates but little surpassing the valve, etc." However, in our specimens—determined by Mr. VanDuzee—they are as described above. In this genus, within certain limits, the genitalia are variable in form. Moreover, as among Typhlocybrids, many marked changes are produced in the genitalia by drying, so that most characters drawn from these parts require verification in fresh specimens.

In this species the ocelli are rather nearer to the eyes than is usual in the genus.

Gnathodus impictus, VanD.

1892. VanDuzee, CAN. ENT., XXIV., p. 113.

1894. VanDuzee, Trans. Am. Ent. Soc., XXI., p. 307.

Head narrower than the pronotum. Face one-sixth wider than long. Front two-sevenths longer than wide, twice the length of the clypeus. Clypeus as broad at tip as at base, sides subparallel, tip strongly, evenly rounded. Genæ broad below the loræ. Vertex distinctly produced. Pronotum little less than twice wider than long, length two and a-half times that of the vertex, hind margin distinctly incurved, curvature less than half the length. Ovipositor about equalling pygofers. Hind margin of last ventral segment of female truncate or slightly incurved. Plate in male strongly rounded; valves strongly produced; tips as long as discs, slender, incurved at apex; valves and pygofers with strong white spines.

Colour green, yellowish beneath and on scutel; anterior edge of pronotum and basal angle of scutel with faint indications of rufous. Abdomen above, except margins of segments, black. Elytra whitish-translucent, costa at base sometimes greenish. Length, 3.5-4 mm.

The above description was made from a male and female collected at Lakeland, Md. (F. C. Pratt). These do not fit the original description exactly in the form of the male genitalia, but the difference is not specific and the specimens are otherwise typical. I also have specimens before me from Salineville, Ohio (Cornell Univ. Coll.); Washington, D. C. (Heidemann); Ag. Coll. Miss. (H. E. Weed). Specimens from the collection of the Ill. State Lab. Nat. Hist. bear the following data:—April 23, on rye; May 7, on strawberry; May 9, on blue-grass; June 22, on wheat. The species was originally described from New Brunswick, N. J. (Smith).

Gnathodus impictus, var. *flavus*, n. var.

Slightly larger and more robust than typical *impictus*. Colour yellow or greenish-yellow throughout, including the subhayline elytra towards the base. Also varying from typical *impictus* in the form of the vertex, face, and male genitalia.

Described from three large series of specimens. The first from Ithaca, N. Y., (Cornell Univ. Coll.). The second from the collection of Mr. Chas. Hart (Illinois:—Acc. Nos. 500-512-514-522-525-526-530-535). The third from the collection of the Ill. State Lab. Nat. Hist., bearing data as follows:—May 15; June 17, on weeds; June 26, on clover; July 2 to 25.

This is one of the most puzzling lot of Jassids that has ever come to my notice. The variation in colour, form, and structure seems extreme, and yet is gradual throughout the whole series. The vertex varies from scarcely at all produced to distinctly produced. The valves in the male vary from not at all produced to the typical form, though the character of the tips is the same in every case. The specimens from Illinois are mostly entirely yellow, though greenish forms occur. On the other hand, those from New York are mostly distinctly greenish-yellow, the yellow forms being rare.

Gnathodus medius, n. sp.

Female: Head narrower than the pronotum. Face about a twelfth wider than long. Front two-fifths longer than wide, length little more than twice that of the clypeus. Clypeus with sides straight, gradually

evenly broadening to a truncate tip, exceeding the genæ more than usual. Genæ of medium width below the loræ. Vertex slightly produced at middle. Pronotum four-fifths wider than long, length four times that of the vertex, curvature little less than half the length, hind margins slightly concave. Last ventral segment truncate, lateral angles curved downward. Ovipositor about equalling pygofer, the latter with scattering short white spines on the apical two-thirds.

Colour yellowish-green. Front with faint indications of one or two transverse arcs. Basal angles of scutellum somewhat darker. Elytra hyaline, with nervures, and costal and inner margins at base, greenish. Sternum greenish. Abdomen above, except margins of segments, black. Length, 4.25 mm.

Pullman, Washington (C. V. Piper). This form is near *impictus*, but is longer and more slender. It also differs in other respects as described above. Larger series from intermediate points, may show it to be but a variety of *impictus*.

Gnathodus manitou, G. & B.

1895. Gillette & Baker, Prelim. List Hemip. Colo., p. 105. Fig.

"Face finely shagreened, a seventh wider than long; clypeus nearly twice as long as broad, rounded at the tip, slightly constricted before the base, basal suture strongly curved; loræ nearly as long and three-fourths as broad as the clypeus; genæ moderately broad, rather deeply depressed beneath the eyes, outer margin angularly incised below the eyes, sharply rounded below, attaining the tip of the clypeus; front one-half longer than broad, twice as long as the clypeus, gradually narrowing below, obtusely rounded above. Vertex one-half longer on the middle than next the eyes, width between the eyes two and one-half times the length at the middle. Pronotum five-sixths broader than long, two and three-fifths times longer than the vertex, curvature two-fifths of the length, posterior margin very slightly concave, anteriorly smooth, posteriorly with scattered feeble punctures, on the posterior median portion finely obliquely rugose, the lines converging backwards. Last ventral segment feebly rounded behind, nearly truncate, pygofer with numerous stout hairs along the whole length. Colour pale green, unicolorous. Elytra hyaline.

"Length, 5 mm. Described from one female.

"Manitou, July (Tucker)."

As this species is only known from the unique type, I quote the original description. The colour should have been stated as yellowish-green instead of pale green

Gnathodus confusus, G. & B.

1895. Gillette & Baker, Prelim. List Hemip. Colo., p. 104. Fig.

"Face one-fifth wider than long; clypeus twice as long as broad, basal suture strongly curved, somewhat constricted near the base, broadest near the tip; loræ about three-fourths as broad and three-fourths as long as the clypeus; genæ broadly depressed beneath the eyes, margin beneath the eyes inverted, broadly rounded below, moderately broad below the loræ and attaining the tip of the clypeus; front one-fifth longer than broad, once and two-thirds the length of the clypeus, superiorly broadly rounded. Face, vertex, and pronotum finely shagreened. Vertex scarcely longer on the middle than next the eyes, width between the eyes slightly more than four times the length at the middle. Pronotum slightly less than twice as broad as long, length nearly four times that of the vertex, curvature about one-half of length, considerably wider than the head, hind margin slightly concave. Transverse groove of scutellum black. Hind margin of last ventral segment of female truncate. Colour yellowish-green. Face sordid yellow, basal angles of the clypeus with an infuscated spot. Vertex of the same colour as the face, with three indistinct longitudinal smoky bands, the ocelli in light areas. Pronotum light yellowish-green on the anterior and lateral margins, darker green on the middle, two dark brown spots medially just back of the anterior margin, the latter in some specimens entirely obsolete. Scutellum pale yellow, basal angles darker. Elytra greenish-subhyaline, slightly maculate with brown near the clavus, somewhat smoky towards the tip. Tergum black with the apical margins of the segments yellow. Venter yellow with the first two or three segments black at the base, pygofers yellowish. Sternum black. Legs yellowish throughout, with infuscated lines on the outside of the femora.

"Length, 3.75 mm. Described from seven females.

"Pleasant Valley, seven miles north-west of Fort Collins, June 12th; Estes Park, July 12th (Gillette); Steamboat Springs, July 12th, on *Carex* (Baker).

"We have a single female specimen which seems distinct from this species, but to which at this time we hesitate giving a name. It differs as follows: The colour more yellowish. Pronotum distinctly less than twice broader than long. Length, 4 mm.

"Estes Park, July 12th (Gillette)."

I quote the original description. Larger series of this species show some variation from the types. With the exception of two specimens from the collection of the Ill. State Lab. Nat. Hist. (Acc. 1880-4620), I have seen no specimens taken outside of Colorado. This form may eventually prove to be a variety of *punctatus*. In *confusus* the vertex is evenly rounded, not produced, while in *punctatus* it is distinctly produced. *Confusus* also lacks the conspicuous maculation of the elytra. In some specimens the markings vary to a bright fulvous.

Gnathodus punctatus (Thunb.) Fieb.*

1782. Thunberg, Act. Ups., VI., p. 21 (*Cicada punctata*).

1866. Fieber, Verh. d. zool.-bot. Gesell, Wien, XVI., p. 505.

(*Gnathodus punctatus*).

1872. Provancher, Nat. Can., IV., p. 378 (*Typhlocyba rosea*).

1890. Provancher, Pet. Faune Ent. Can., III., p. 300-301 (*Typhlocyba punctata* and *T. jocosca*).

1894. VanDuzee, Trans. Amer. Ent. Soc., XXI., p. 307.

Distinguished by the more or less strongly maculated elytra and produced vertex. Otherwise very closely resembling *confusus*. A careful comparison between series of the American forms referred to, this species, and authentic specimens of the European *punctatus*, would be very desirable.

This species is probably widely distributed in the U. S. I have collected it at Ag. Coll., Michigan, and at Fort Collins, Colo., and also have specimens from Ithaca, N. Y. (Cornell Univ. Coll.). There is considerable variation in colour, some specimens having strong pink or roseate suffusion, others being quite strongly green.

Gnathodus occidentalis, n. sp.

Head narrower than pronotum. Face an eighth wider than long. Front about a half longer than wide, and twice the length of the clypeus. Clypeus gradually broadening to the very slightly rounded tip. Genæ broad below loræ. Vertex very slightly produced at the middle. Pronotum about seven-eighths wider than long, three and two-thirds the length of the vertex, curvature seven-fifteenths of the length. Last ventral segment of female truncate at tip. Ovipositor equalling pygofers,

*The synonymy of this species is essentially the same as that given by Mr. VanDuzee in his "List of N. A. Jassoidea." The extended European bibliography I do not attempt to give.

the latter with very short, weak, white spines. Valves of male with long white spines on edges of discs, tips produced into finger-like processes as long as discs.

Colour pale green. Face with faint indications of about three brownish arcs. Basal angles of scutellum yellowish. Elytra milky white, with the veins and costal margin greenish. Sternum black. Abdomen above, and beneath at base, except margins of segments, black. Length, 4.25 mm.

Pullman, Washington (C. V. Piper). This form may prove to be a variety of *medius* on the examination of large series, but it differs in having a black sternum and milky elytra.

Gnathodus Livingstonii, n. sp.

Female: Head narrower than the pronotum. Face a twelfth wider than long. Front a fourth longer than wide, somewhat less than twice the length of the clypeus. Clypeus gradually broadening to the truncate tip. Genæ narrow below the loræ. Vertex very slightly and broadly produced, with a small but distinct pit on either side at base, midway between the median line and eye. Pronotum two-thirds wider than long, about four times the length of the vertex; curvature seven-sixteenths of the length, hind margin straight. Hind margin of last ventral segment truncate. Ovipositor about equalling pygofers, the latter with rather long whitish spines on the apical two-thirds.

Colour bright, rather deep, green. Scutellum yellowish at basal angles. Elytra pearly-white, greenish towards the base, nervures broadly green. Sternum, abdomen above and at base beneath except margins of segments, black. Robust. Length, 4.5 mm.

Corfield, Vancouver Island, B. C. (Mr. Clermont Livingston). This is one of many most interesting things which Mr. Livingston's industry has turned up in Vancouver Island, and I take pleasure in dedicating it to him. It is near *occidentalis*, but is longer, more robust, and differs in coloration.

PROSOPIS SUBTILIS.

Prosopis mesilla, n. n.

Syn. *P. subtilis*, Fox in litt., Ckll., Tr. Am. Ent. Soc., 1895, p. 295.
(Not *P. subtilis*, Forst.)

T. D. A. COCKERELL.

NEW CULICIDÆ FROM NORTH AMERICA.

BY D. W. COQUILLETT, WASHINGTON, D. C.

In the course of identifying the Culicidæ in the National Museum collection and those received by Mr. L. O. Howard from various correspondents, for mention in a paper which he is about to publish, entitled, "Notes on the Life-history of *Culex pungens*, with remarks about other Mosquitoes," three forms were met with which clearly represent new species; and as Mr. Howard desires to exclude all matter of a purely technical nature from his paper, it was deemed advisable to publish the new species in one of our scientific periodicals. Accordingly, the descriptions are offered herewith:—

Culex signifer, n. sp.—♀. Head velvet black, its tomentum silvery-white, the pile black; antennæ, proboscis and palpi black, their tomentum mixed brown and silvery-white, that on apices of palpi wholly silvery. Thorax velvety brownish-black, marked on the anterior half with two silvery-white subdorsal vittæ, and with a silvery-white arcuate lateral line extending the entire length of the thorax; pleura marked with several spots of silvery-white tomentum; scutellum with two spots of similar tomentum on the upper side and one at the tip. Abdomen black, its tomentum violaceous, that at base of each segment white. Legs brown, femora largely yellowish, the tomentum mixed brown and silvery-white, that at apices of tibiæ pure white, each end of tarsal joints white, most extended on the hind tarsi; tarsal claws destitute of teeth on the under side. Wings hyaline, veins yellowish, the scales mixed brown and white; length, 4.8 mm.

District of Columbia. A single specimen, captured by the writer in June.

Near *fasciatus*, Fabr., but the lateral silvery line on the thorax is not strongly bent inward at the middle, and the tarsal claws are not toothed.

Culex tarsalis, n. sp.—♂. Head black, its pile and tomentum mixed brown and white; antennæ brown, apices of joints one to eleven broadly white, the hairs gray; proboscis nearly twice as long as the head and thorax united, naked, black, marked near the middle with a broad white ring; palpi slender, tapering to the tip, brown, the base of each joint white, sides of last two joints and outer side of the preceding one rather long gray pilose. Thorax black, marked with a dorsal gray vitta, tomentum of thorax yellowish, except a white subdorsal undulating line each side, a spot in front of the scutellum, above the root of each wing, and on

the pleura. Abdomen black, a fascia of white tomentum at base of each segment and at apices of the last three. Legs brown, in front and behind covered with white tomentum, bases of femora yellow, both ends of tarsal joints broadly white; front and middle tarsal claws each bearing a tooth on the under side, hind tarsal claws simple. Wings hyaline; scales of veins brown, with a few white ones intermixed.

♀ same as the ♂, with these exceptions: Palpi black, the apex broadly and inner side of apex of the penultimate joint covered with white tomentum; antennæ wholly brown; tarsal claws destitute of teeth. Thorax sometimes yellowish-brown. Length, 4.5 mm.

Argus Mts. and Folsom, Calif. One male and four females in the National Museum, collected by Mr. A. Koebele.

Closely related to *teniorhynchus*, Wied., but in that species the male has a tooth on under side of one tarsal claw and two beneath the other claw, and the female has each front tarsal claw toothed.

Megarhinus rutila, n. sp.—♂. Head black, tomentum of occiput blue in the centre, white next the eyes; antennæ brown, the first joint covered with blue tomentum on the outer side, that on the inner side silvery-white; hairs of antennæ dark gray, their bases brown; proboscis and palpi black, covered with an appressed blue, golden and violet tomentum. Thorax brown, its tomentum golden-brown and violet, that on the lateral margins pale golden; humeral angle and two large spots on the pleura covered with golden tomentum, scutellum covered with blue, black and violet tomentum. Abdomen black, its tomentum blue, becoming violet at the tip, that on the lateral margins golden, on the venter blue, mixed with a few golden ones; sides of abdomen bearing a few short pale yellow hairs. Legs black, the tomentum mixed blue, violet and golden, that on the coxæ and apices of femora entirely golden; second joint and base of the third of each front and middle tarsi, fourth joint and base of the fifth of the hind tarsi, white; one claw of each front and middle tarsi toothed, the other claws simple. Wings hyaline, costal margin and the veins brown, the scales blue and violet.

♀ same as the ♂, with these exceptions: First joint of antennæ destitute of blue and silvery tomentum; second, third and base of fourth joint of the front and middle tarsi, white; tarsal claws simple. Length, 7 to 10 mm.

North Carolina and Georgiana, Florida. Three males and five females in the National Museum.

Readily recognized by the colouring of the tarsi.

IN REPLY TO CRITICISM.

BY HARRISON G. DYAR, PH. D., NEW YORK.

Mr. J. W. Tutt's article (Trans. Ent. Soc., Lond., 1895, pp. 343-362), reviewed by Mr. Grote (CAN. ENT., XXVII., p. 326), in which he correlates the recent attempts at a classification of the Lepidoptera, is both instructive and stimulating. Mr. Tutt is to be thanked for his useful and impartial criticism. As far as my own work on the larvæ is concerned, the following points are brought out:—

(1) The position of the Pyromorphidæ, Megalopygidæ and Eucleidæ was not found entirely from larval characters, and I am criticised for this. I accept the criticism; but at the time I had no material to prove their position entirely on larval characters. At present I have. Dr. Chapman, with his usual generosity, sent me several species of Anthroceridæ in stage I. (*Anthroceræ lonicera*, *Adscita statice*, *A. geryon* and *A. globulariæ*), and all show the position of the stage to be such as I assumed for the position I assigned the families to. The Anthroceridæ have a primitive first stage: tubercles i. and ii. approximate, iii. normal, iv. and v. approximate, vi. (and the other thoracic subprimaries) absent, vii. on the leg base. The Pyromorphidæ have not been examined, but must go with the Anthroceridæ (Mr. Tutt's Zygaenidæ). The Megalopygidæ and Eucleidæ (=Limacodidæ) have no primitive first stage; but I have gotten at the arrangement of their tubercles in another manner. I have shown that the group of smooth Eucleid larvæ have their spinose warts greatly reduced by degeneration. This has proceeded so far that the setæ have reverted to the primitive condition. Not in the first stage, however, for here another peculiar process of extreme reduction has set in, whereby setæ i. and ii. have coalesced at base, forming a Y-shaped process, and in other species one arm of the Y has shortened, leaving apparently a single knobbed seta. But, after stage I. and before the larva is old enough so that the setæ are too small to be well examined, the characteristic high Micro. type of setæ is very evident, in our *Apoda y-inversa* and presumably also in the closely allied European *A. avellana* (*Limacodes testudo*). The details of the thoracic setæ confirm these conclusions nicely. The Megalopygidæ I assume to go with the Eucleidæ. I have no direct proof for them, as the primitive first stage is wanting, and I have yet to see any degenerate forms.

(2) My failure to divide the Tineina, due to lack of material, is noticed. I have been able partially to remedy this lack (see Journ. N.

Y. Ent Soc., III., pp. 18-21), but I do not find that the larvæ present any remarkable diversity of structure. Some are exceedingly generalized; so much so as to suggest that they represent the stem form which gave rise to the Noctuina (Agrotides, Grote) as well as to the higher Micros. (Tineides), and I am inclined to confirm Mr. Hampson's remark, quoted by Mr. Tutt (p. 360): "As far as I am able to judge, the Tineidæ represent the ramifications of one branch of the Lepidoptera, some families generalized, others highly specialized, and not a heterogeneous collection of families sprung from various parts of the Lepidopterous tree as the old family Bombyces did."

(3) My position for the Pyralidæ among the true Micros. is shown to be at variance with the conclusions of Chapman and Hampson. This is a real difference, and is only confirmed by further material. In fact, the difference extends, as regards Dr. Chapman's classification, to all his Pyraloid obtectæ, which I have had before me. This is easily reconciled if we may suppose that the obtected pupal character has been developed independently, but in a parallel manner in more than one line of descent. In fact, I think in at least three, for I believe the Sphingides and Bombycides (Saturnians) are derived from a stem ancestral to that of the Tineides and Agrotides, whether the former two superfamilies be closely related or not. At any rate, I am content to let this contradiction stand for the present.

Finally, I would correct a passage in Mr. Tutt's paper where I am unintentionally misquoted (p. 347), apparently from a misunderstanding. I did not intend to imply that the most primitive form of tubercle is found "exclusively in the Jugatæ and Psychidæ," as Mr. Tutt's quotation reads. The original sentence is: "It is found in the less specialized families of all the groups . . . and exclusively in the Jugatæ and in the Psychidæ." As a matter of fact, I separated the Psychidæ thus from a consideration of the supposed homology of tubercles i. and ii. (see Synopsis, Ann. N. Y. Acad. Sci., VIII., p. 203), not from the generalized condition of the setæ, which clearly could not be done, as the original sentence shows. I find now that this separation was due to a misapprehension, and the Psychidæ really fall in with the other Tineides. (Compare *Hyponomeuta cognatellus* for a similar reversal of tubercles i. and ii., by which I was deceived.) However, Mr. Tutt's misinterpretation of the passage does not affect his conclusions essentially.

THE AMERICAN SPECIES OF ISOTOMA.

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

The genus *Isotoma*, as far as known, is confined to the Northern Hemisphere and to the more northern part of this region. Thirty-one species are recorded from Europe and Asia, while the same number is recorded in the present paper, from the Eastern United States.

The characters for differentiating the species of *Isotoma* are all drawn from the form of the claws and the apical segment of the spring. In the following descriptions, the larger claw is referred to as the superior and the smaller as the inferior claw. Several species have the superior claw trilobed when viewed from above; the lateral lobes appear as a large tooth along the outer margin of the claw when viewed from the side. The tarsi consist of a single segment. The apices of the tibiae in many species bear long, club-shaped hairs, which are known as tenant hairs. The spring is known technically as the furcula, its basal segment as the manubrium, the middle segment as the dentes, and the apical segment as the mucro. In the following descriptions, the furcula is considered as if extended caudad, the toothed edge being dorsad. The horizontal teeth of the mucro are those having their axis parallel to the axis of the mucro, and the vertical teeth those in which their axis is perpendicular to the axis of the mucro. The teeth are numbered from the apex cephalad. No measurements are given, as they have been looked upon as worthless; the formulæ of the claws and mucro are all that are necessary to recognize the species, young or adults.

I am under obligations to Mr. Samuel Henshaw, Museum Comparative Zoology, Cambridge, Massachusetts, for an opportunity to study the types of Dr. Packard, including all his species except *Besselsii* and *Walkerii*; to Mr. L. O. Howard, Department of Agriculture, Washington, D. C., for type specimens of *Besselsii* and of *palustris*, Muller, from Sweden, determined by Dr. Tycho Tullberg; to Mr. Nathan Banks, Sea Cliff, N. Y., and many others, who have been given due credit for the presentation of specimens.

1. Superior claw without teeth on the inner margin.....2.
Superior claw with teeth on the inner margin..... :18.
2. Mucro with the first tooth at the base of the second.....3.
Mucro with the first tooth not at the base of the second..... 8.
3. Inferior claw with a tooth on the inner margin; superior claw without
teeth on the outer or inner margins; tibiae without tenant hairs;

muco with four teeth, the first at the base of the second, the second and third subequal, the fourth smaller, arising at the side; dentes longer than the manubrium; ocelli sixteen, eight on each side of the head. 4.

Inferior claw without a tooth on the inner margin, inner margin strongly, roundly, dilated; superior claw without teeth on the outer or inner margins; tibiæ with a single tenant hair; muco with three teeth, the first at the base of the second, the second and third subequal in length, vertical; dentes twice the length of the manubrium; body brownish, in some specimens with a slight indication of a median dorsal line; legs and furcula yellowish; eye spots black; antennæ twice the length of the head, the apices of the segments purplish, at base greenish. The typical specimens are from Salem, Massachusetts, and Waco, Texas. The Massachusetts specimens belong to *Isotoma viridis*, Bourlet, an European species, while the specimens from Texas are distinct, and Dr. Packard's name is retained for this form *tricolor*, Pack.

4. Dorsum with a distinct median black line 5.
- Dorsum without a median black line 6.

5. Yellowish, median and lateral black lines distinctly marked, median black line without lateral dilations in the third and fourth abdominal segments. Habitat—Europe, Asia, Africa, and North America **palustris*, Muller.

Yellowish, median black line with distinct lateral line-like dilations in the third and fourth abdominal segments; sides of the thoracic and abdominal segments clouded, darker near the margin. Habitat—Europe **palustris aquatilis*, Muller.

6. Segments yellowish, with a wide transverse black band, covering the anterior two-thirds of each segment. Habitat—Boreal Europe **palustris balteata*, Reuter.

Segments entirely of one colour 7.

7. Entirely dilute greenish, immaculate. Habitat—Boreal Europe **palustris prasina*, Reuter.
- Entirely reddish-violaceous; antennæ and feet blue-black. Habitat—Boreal Europe **palustris fucicola*, Reuter.

*Species not seen.

8. Mucro with the first tooth horizontal, without any tendency towards forming a vertical or subvertical hook.....9.
- Mucro with the first tooth vertical or subvertical, at least somewhat hooked.....11.
9. Mucro with two teeth.....10.
- Mucro with three teeth—the first very short, horizontal, appearing somewhat as when the first tooth is at the base of the second; the second and third, long, vertical, subequal. There is a round knot-like prominence at the base of the mucro, but it is not tooth-like; superior claw without teeth on the outer and inner margins; inferior claw scarcely dilated on the inner margin, with a tooth at middle; dentes twice the length of the manubrium; the furcula reaching the ventral tube; body, legs and furcula, yellowish; eye spot black; antennæ a little longer than the head, purplish at apex. Habitat—Salem, Ohio.....*aequalis*, n. sp.
10. Manubrium longer than the dentes; furcula not reaching the ventral tube; superior claw without teeth on the outer and inner margins; inferior claw with the inner margin not at all dilated, and without teeth; tibiæ with two tenant hairs; body mottled grayish, paler at the apices of the segments; antennæ and legs white; antennæ but little longer than the head; body long and slender. Habitat—Fort Collins, Colorado (Carl F. Baker).....*elongata*, n. sp.
- Manubrium shorter than the dentes, not extending beyond the apex of the abdomen; furcula not reaching the ventral tube; superior and inferior claws without teeth; inner margin of the inferior claw greatly and roundly dilated; mucro with two teeth—the first horizontal and pointedly rounded, the second vertical, of the same length as the first, pointed at apex; body, legs, antennæ, and furcula, white; antennæ not longer than the head. Collected on water drawn from a well. Habitat—Baton Rouge, Louisiana (H. A. Morgan).....*manubriata*, n. sp.
11. Mucro with two teeth.....12.
- Mucro with three or more.....13.
12. Teeth of mucro indistinct; mucro shaped like a portion of the rim of a wagon wheel, the cut end transversely emarginate, the dorsal and ventral corners forming the teeth; the superior and

inferior claws without teeth; the inferior claw dilated on the inner margin; antennæ not twice as long as the head. Habitat—Nova Zembla, Northern Siberia, and

Greenland**bidendiculata*, Tullb.

Teeth of mucro distinct, prominent, two first slightly longer than the second, both pointing caudad; superior and inferior claws without teeth; inferior claw of inner margin roundly dilated at middle; furcula reaching the ventral tube; dentes twice as long as the manubrium; body and antennæ blackish; legs and furcula white; antennæ a little longer than the head, the second and third segments dilated at apex. Habitat—Salineville, Ohio*parva*, n. sp.

13. Mucro with three teeth 14.

Mucro with four teeth—the first short, hooked; the second, long, vertical, and about as long as the mucro is wide; the third and fourth subequal to the second, vertical and opposite; superior claw without teeth; the inferior claw without teeth, but with the inner margin broadly, roundly, dilated; furcula not attaining the ventral tube; the dentes and manubrium subequal in length; body and antennæ yellowish, mottled with gray; legs and furcula white; antennæ not longer than the head. Habitat—Dover, Massachusetts (A. P. Morse)*unica*, n. sp.

14. Superior claw with a tooth on the outer margin, inner margin without teeth; inferior claw without teeth, and the inner margin broadly, roundly, dilated; mucro with three teeth, the first and second of the same length, pointing in the same direction, and in the same line, the third shorter, vertical; furcula attaining the ventral tube; dentes twice the length of the manubrium; body and antennæ brownish-black; legs and furcula white; antennæ a little longer than the head. Habitat—Salem, Ohio*communa*, n. sp.

Superior claw without a tooth on the outer margin 15.

15. Second tooth of mucro shorter than either the first or third, the third as long or longer than the first, all pointing dorso-caudad; superior and inferior claws without teeth; inferior claw somewhat dilated on the inner margin towards the base; furcula reaching the ventral tube; dentes twice the length of the

* Species not seen.

manubrium ; body and antennæ dilute purplish ; legs and furcula white ; antennæ a little longer than the head. This species is paralleled in the European fauna by *Isotoma sensibilis*, Tullb. Habitat—Salineville, Ohio. *trispinata*, n. sp.

Second tooth of mucro as long as either the first or third 16.

16. Inferior claw without a tooth on the inner margin 17.

Inferior claw with a tooth on the inner margin, strongly dilated at middle ; superior claw without teeth on the outer or inner margins, the outer margin roundly interrupted at middle ; mucro with three teeth, the first long, terminal, evenly curved, and of the same length as the second, the second and third of the same length, opposite, as long as the mucro is wide, and pointing in the same direction as the first ; furcula long, reaching to near the ventral tube ; dentes very slightly longer than the manubrium ; body yellowish ; furcula and legs white ; antennæ yellowish, apices of the segments purplish ; apical segment semi-circular. Habitat—Fredericksburg, Virginia (William D. Richardson *tridentata*, n. sp.

17. Furcula reaching the ventral tube ; the dentes twice as long as the manubrium ; superior and inferior claws without teeth ; inferior claw with its inner margin roundly dilated towards the base ; mucro with three teeth, the first tooth distant from the second, making a prominent curve, and pointing dorso-caudad, the second and third vertical, subequal in length, if any difference the third the shortest ; body, legs, antennæ, and furcula, white ; antennæ slightly longer than the head ; eye spots black. It is impossible to distinguish living specimens of this species from the smaller species of *Lipura*, except when they jump. Habitat—Maine, Massachusetts, and New York . . . *albella*, Pack.

Furcula not reaching the ventral tube ; the manubrium distinctly longer than the dentes ; superior and inferior claws without teeth ; the superior claw wide at base, a short distance from which it is suddenly and greatly constricted ; the inferior claw with the inner margin dilated at base, rounded out at apex ; mucro with three teeth, the first long, subvertical, distinctly hooked, the second and third of the same length, on opposite sides, and almost opposite ; body, legs, antennæ, and furcula, blackish ; head elongate ; antennæ about as long as the head,

- the first and second segments dilated, as broad as long, and twice as broad as the third or fourth. Habitat.—Polaris Bay.....*Besselsii*, Pack.
18. Superior claw with one tooth on the inner margin.....19.
Superior claw with two teeth on the inner margin.....33.
19. Superior claw with a tooth on the outer margin.....28.
Superior claw without a tooth on the outer margin.....20.
20. Inferior claw with a tooth on the inner margin.....26.
Inferior claw without a tooth on the inner margin.....21.
21. Mucro emarginate at apex, the dorsal angle immediately dorsad of the ventral angle, with two teeth, the dorsal angle being the first, the second of the same length, but more pointed; furcula reaching the ventral tube; dentes twice the length of the manubrium; superior claw with a single tooth on the inner margin and none on the outer margin; inferior claw without teeth, dilated at base, the dilation interrupted before the middle, making a right angle; antennæ and body bluish-black; legs brownish; furcula white; antennæ one-third longer than the head. Habitat—Salineville, Ohio.....*brunnea*, n. sp.
- Mucro not emarginate at apex.....22.
22. Mucro with two or three teeth.....23.
Mucro with four teeth, the first minute, a mere hook, the second and third of the same length, vertical, as long as the mucro is wide, the fourth slightly shorter than the third and laterad of it, its base in a more dorsal plane, and pointing caudad; furcula attaining the ventral tube; dentes more than twice the length of the manubrium; superior claw with a single tooth on the inner margin and none on the outer margin; the inferior claw without teeth, the inner margin slightly dilated; body and antennæ mottled black; legs and furcula white; antennæ longer than the head. Habitat—Salineville, Ohio.....*synonymica*, n. sp.
23. First tooth of mucro horizontal or subhorizontal.....24.
First tooth of mucro forming a distinct hook.....25.
24. Mucro with three teeth, the first subhorizontal, broad, the second and third longer than the first, of equal length, one behind the other, pointing cephalad; furcula not reaching the ventral tube; the dentes twice the length of the manubrium; superior claw without teeth on the outer margin and with a single tooth on the

inner margin; inferior claw without teeth, the inner margin broadly, roundly, dilated; tibiæ with two tenant hairs; body dilute black; antennæ, legs, and furcula, dirty white; manubrium scarcely extending beyond the apex of the abdomen; body long and slender; antennæ not longer than the head. Habitat—Dover, Massachusetts (A. P. Morse), and Ithaca, New York.....*dilatata*, n. sp.

Mucro with two teeth, the first horizontal, the second vertical, of the same length as the first; furcula not reaching the ventral tube; dentes slightly longer than the manubrium; superior claw without a tooth on the outer margin, and with a single tooth on the inner margin; inferior claw without teeth, and not dilated on the inner margin; body, legs, antennæ, and furcula, white; manubrium not extending beyond the apex of the abdomen; antennæ of the same length as the head. Habitat—Maine and Massachusetts.....*nivalis*, Pack.

25. Dentes and manubrium subequal in length; furcula not attaining the ventral tube; superior claw without teeth on the outer margin, and with a single tooth on the inner margin; inferior claw without teeth, the inner margin not dilated; mucro with three teeth, all in the same line, the first terminal, minute, vertical, and forming a distinct hook; the second and third as long as the mucro is wide, and pointing cephalad; body, antennæ, and legs blackish-purple; furcula white; antennæ short, hardly as long as the head, the fourth segment longer than the three basal segments combined. Habitat—Salineville, Ohio.....*brevipenna*, n. sp.

Dentes more than twice as long as the manubrium; furcula attaining the ventral tube; mucro with three teeth, the first long, distinctly hooked, not extending dorsad beyond the middle of the second tooth; the second long, pointed, broad at base, about as long as the mucro is wide, and pointing dorsad; the third cephalad of the second, about half as large, and extending dorso-ventrad; superior claw without teeth on the outer margin, and with a single tooth on the inner margin; inferior claw without teeth, the inner margin greatly dilated; body, legs, antennæ, and furcula, snuff-yellow; antennæ about twice as long as the head. In determining this species great care will need to be taken, or

the tooth on the inner margin of the superior claw will be overlooked; it is very faint, scarcely perceptible in some cases. The type specimens of *Isotoma Walkerii* appear to be lost. There is nothing in the description of *Walkerii* to hinder its being united with *Isotoma leonina*. The only definite characters given in the description of *Walkerii* are a comparison of the lengths of the segments of the antennæ. Specimens that are undoubtedly *leonina*, and compared with the types of that species, do not differ from the description of *Walkerii*. A very common species under the bark of recently felled trees.

Habitat—Massachusetts (Packard); Ithaca, New

York *Walkerii*, Pack.

26. Tibiæ without tenant hairs; superior claw without teeth on the outer margin, and a single tooth on the inner margin; inferior claw with a tooth on the inner margin; mucro with three teeth—the first forming a blunt, subhorizontal, obliquely rounded end; the second and third of the same length, about as long as the mucro is wide; the third tooth in a higher plane than the second; furcula not attaining the ventral tube; dentes longer than the manubrium; body black, paler at apices of the segments; antennæ dirty white; legs and furcula white; antennæ as long as the head. Habitat—Salineville, Ohio. . . *obsoleta*, n.sp.

Tibiæ with tenant hairs 27.

27. Mucro with three teeth—the first long, distant from the second, and making a distinct vertical hook; the second of the same length as the first, vertical, and in the same line; the third smaller than the second, and not in the same line; furcula attaining the ventral tube; dentes twice the length of the manubrium; superior claw without teeth on the outer margin, and a single tooth on the inner margin; inferior claw greatly dilated at base, dilation squarely interrupted at middle, and with a distinct tooth on the outer angle of the dilation; tibiæ with two tenant hairs; body and antennæ black, paler at the juncture of the segments; legs dirty white, blackish at base; furcula white; antennæ slightly longer than the head; a bristle at the apex of the dentes extends beyond the apex of the mucro. Habitat—Dover, Massachusetts (A. P. Morse). *determinata*, n. sp.

- Mucro with three teeth, the first horizontal, short, the second and third long and slender, vertical, about as long as the first, and as long as the mucro is wide; furcula not attaining the ventral tube; dentes slightly longer than the manubrium; body and antennæ grayish-yellow; legs and furcula white; antennæ slightly longer than the head. Habitat—Salineville, Ohio... .. *inclinata*, n. sp.
28. Inferior claw with a tooth on the inner margin 29.
 Inferior claw without teeth, the inner margin dilated at base; superior claw with a tooth on the outer margin and another on the inner margin; mucro with three teeth, the first and third of about the same length, the first forming a distinct hook, the second half as long again as either the first or third, all vertical; furcula attaining the ventral tube; the dentes more than twice as long as the manubrium; body and antennæ black; legs and furcula brownish-white; antennæ longer than the head, the segments long and slender. Habitat—Ithaca, New York... .. *speciosa*, n. sp.
29. Mucro with four teeth..... 30.
 Mucro with five teeth, the first tooth short, one-third the length of the second, the second and third subequal, vertical, as long as the mucro is wide, the fourth shorter than the third and cephalad of it, the fifth very small and laterad of the fourth; superior claw with a tooth on the outer and inner margins; inferior claw with a tooth on the inner margin; furcula reaching the second abdominal segment; dentes distinctly longer than the manubrium; ocelli fourteen, seven on each side of the head; body griseo-violaceous; antennæ about as long as the head, the last segment longest, slightly arcuate. Habitat—St. Lawrence Island, Behring Sea..... **grandiceps*, Reuter.
30. Mucro with the first tooth distinct, prominent..... 31.
 Mucro with four teeth, the first minute, at the base of the second, the second long, curved, the third and fourth opposite, of the same length as the second; furcula long, reaching the ventral tube; dentes more than twice the length of the manubrium; superior claw with a tooth on the outer margin and another on the inner margin; inferior claw dilated at base and with a tooth on the inner margin; body and antennæ blackish; furcula and legs

* Species not seen.

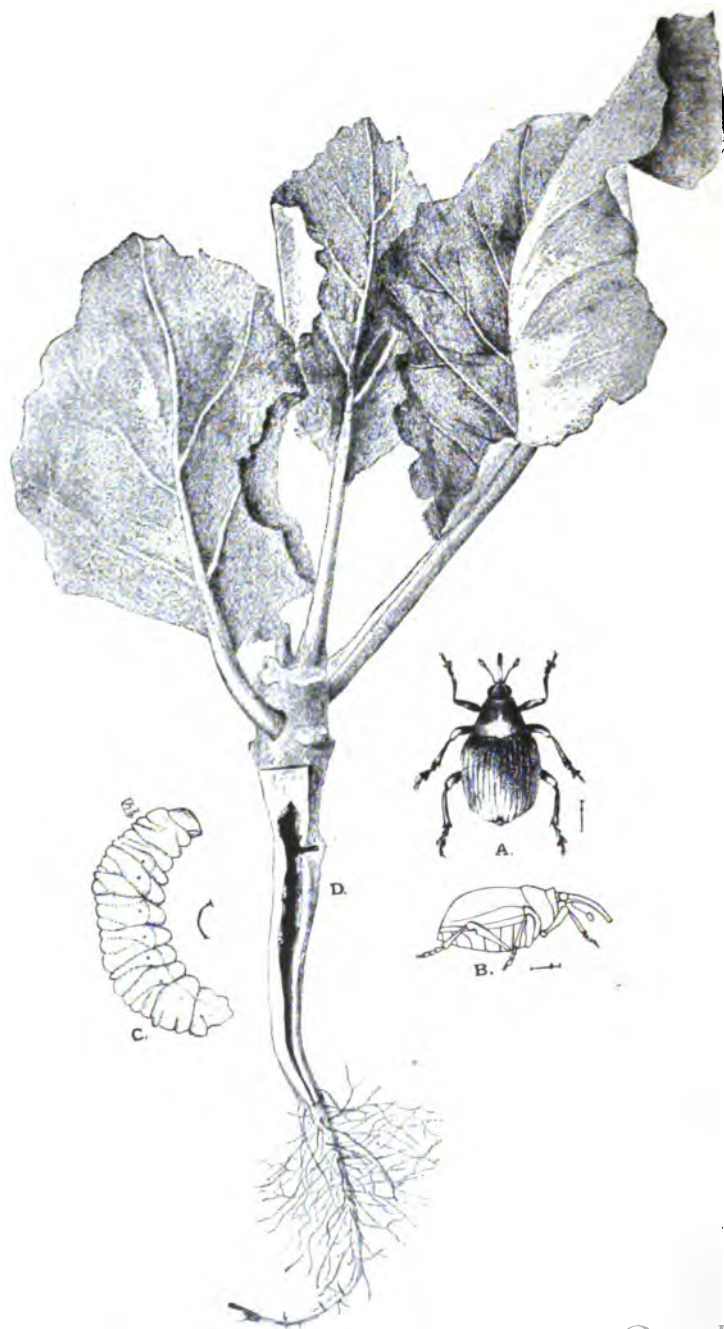
- white ; body, legs, and antennæ, densely hairy ; antennæ longer than the head. Habitat—Washington, D. C. (Nathan Banks).....*capitola*, n. sp.
31. First tooth of mucro shorter than the second, if as long, subhorizontal.....32.
- First tooth of mucro as long as the second, pointing dorso-caudad, and as long as the mucro is wide, the third and fourth subequal, opposite, and smaller than the second; the furcula attaining the ventral tube ; manubrium elongate ; dentes twice as long as the manubrium ; superior claw with a tooth on the outer margin and another on the inner margin ; inferior claw dilated, with a tooth on the inner margin ; body and antennæ black and purplish ; legs and furcula brownish ; antennæ paler at base, longer than the head. Habitat—Ithaca, New York, and Salineville, Ohio.....*nigra*, n. sp.
32. Furcula attaining the ventral tube ; dentes twice as long as the manubrium ; mucro with four teeth, the first small, subhorizontal, and with a distinct hook, the first and third of the same length, the second one-half longer than the third, as long as the mucro is wide, the first, second and third in the same line, vertical, the fourth slightly longer than the third, and pointing slightly caudad ; superior claw with a tooth on the outer margin and another on the inner margin ; inferior claw dilated at base, with a tooth on the inner margin at middle ; antennæ and body black ; legs and furcula dirty white ; antennæ of the same length as the head. Habitat—Ithaca, New York, and Salineville, Ohio.....*terminata*, n. sp.
- Furcula short, not attaining the ventral tube ; dentes longer than the manubrium ; mucro with four teeth, the first small, not minute, forming a vertical hook at apex, the second and third of the same length, about as long as the mucro is wide, one cephalad of the other, the fourth smaller than the third, and placed laterad of it ; superior claw with a tooth on the outer margin and another on the inner margin ; inferior claw dilated at base, interrupted at middle, outer angle of dilation with a tooth ; body greenish-white, washed with purplish in places ; antennæ greenish-white ; apices of segments purplish ; legs and furcula white ; antennæ longer than the head. Habitat—Beverly, Massachusetts (A. P. Morse).....*lateraria*, n. sp.

33. Inner margin of inferior claw with a tooth 34.
 Inner margin of inferior claw not with a tooth, inferior claw two-thirds the length of the superior claw; superior claw with a tooth on the outer margin and two on the inner margin; mucro with two teeth, the first forming a distinct vertical hook, the first and second subequal in length, about as long as the mucro is wide; furcula reaching to near the ventral tube; manubrium and dentes subequal in length; body greenish-white, the sides and margins of the segments washed with purplish; legs and furcula white; antennæ of the same colour as the body; apices of the segments ringed with purplish, longer than the head. This species will be easily recognized by the great length of the inferior claw; in all the other species examined the inferior claw is not more than half as long as the superior claw. Habitat—Agricultural College, Mississippi (H. E. Weed). *longipenna*, n. sp.
34. Mucro with three teeth, the first long, forming a distinct hook, the second and third of the same length, opposite, and about as long as the mucro is wide; furcula long, attaining the ventral tube; dentes more than twice as long as the manubrium; superior claw with a tooth on the outer margin and two on the inner margin; inferior claw with inner margin somewhat dilated at middle, with a vertical tooth; antennæ not quite twice as long as the head; eye spots black 36.
 Mucro with four teeth, the first minute, at the base of the second, the second long, forming a hook, the third and fourth opposite, of the same length as the second, about as long as the mucro is wide; furcula attaining the ventral tube; dentes more than twice as long as the manubrium; superior claw with a tooth on the outer margin and two on the inner margin; inferior claw with a tooth on the dilated inner margin; antennæ longer than the head, purplish at apex; eye spots black; body densely covered with long bristles, one or two on each segment much longer than the others 35.
35. Body and legs uniformly grayish-white. Common under bark among the droppings of boring beetles. Habitat—Salem, Massachusetts (Packard); Brazos County, Texas (Nathan Banks); Ithaca, New York *glauca*, Pack.
 Body white, the segments marked with a broad transverse band of purplish or blue, mottled with paler. Habitat—Franconia, New Hampshire (Mrs. A. Trumbull Slosson) .. *glauca montana*, n. var.

36. Body yellowish-fuscos, purplish or black without a median black line 37-
 Body in great part greenish-yellow with a distinct median black line.
 Habitat—Europe; Massachusetts (Packard); White Mountains, New Hampshire (Mrs. Annie Trumbull Slosson); Long Island (Nathan Banks); Virginia (Wm. D. Richardson); Ithaca, New York..... *viridis riparia*, Nic.
37. Dorsum, except a few yellowish dots, entirely fuscous. The Massachusetts specimens of *Isotoma tricolor*, together with *Isotoma Belfragei*, *purpureus* and *plumbea*, belong to *viridis*, Bourlet. Habitat—Europe; Massachusetts, and Waco, Texas (Packard); Brazos County, Texas (Nathan Banks); Beverly, Massachusetts (A. P. Morse); California (Schott); Ithaca, New York..... *viridis*, Bourlet.
 Dorsum distinctly marked with yellowish..... 38-
38. Yellowish with a distinctly marked wide transverse black band on each segment. Habitat—Boreal Europe... **viridis cincta*, Tullb.
 Yellowish, but not with such a band..... 39-
39. Each segment marked at middle with a loop-shaped mark, the sides of the closed end more distant than those of the open end; the open end at the cephalic end of each segment; the closed end sometimes interrupted; the sides of the segments prominently figured with black. Habitat—Boreal Asia..... **viridis arctica*, Schott.
 Each segment marked with three closed and united deltoid-shaped marks. Habitat—Agricultural College, Mississippi (H. E. Weed)..... *viridis delta*, n. var.
- Species that could not be placed from lack of specimens and of figures of the claws and mucrones:—
Isotoma quadrioculata, Tullb.—“*Segmentum tertium abdominis brevius quam quartum. in quo furcula inserta est. Ocelli 4; 2 in utroque latere capituli. Dentes furculæ manubris non longiores, recti; mucrones bidenticulati. Long. 1¼ mm.*” Habitat—Boreal Europe and America. 1872. Tullberg, Sveriges Podurider, p. 48.
Isotoma fimetaria, Linn.—“*Segmentum tertium abdominis brevius quam quartum, in quo furcula inserta est. Ocelli nulli. Dentes furculæ manubrio fere duplo longiores, recti; mucrones bidenticulati. Long, 1 mm.*” Habitat—Boreal and Central Europe and Boreal America. 1872. Tullberg, Sveriges Podurider, p. 48.

* Species not seen.

Mailed February 3rd, 1896.



THE CABBAGE CURCULIO (*CEUTORHYNCHUS RAPAE*, Gyll.)

The Canadian Entomologist.

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CEUTORHYNCHUS NAPI OR CEUTORHYNCHUS RAPÆ.

BY F. M. WEBSTER, WOOSTER, OHIO.

In the report of the Commissioner of Agriculture for 1888, p. 136, Miss Mary E. Murtfeldt gives some notes on the development of *Ceutorhynchus napi*, Gyll., which had worked serious injury to cabbage in Missouri, the species having been determined, as stated by Miss Murtfeldt, by the late Dr. C. V. Riley, at that time United States Entomologist. Prior to the publication of Miss Murtfeldt's notice, she had informed me of her "find," and on my writing to ask her if there was not a mistake, and if she did not refer to *rapæ*, she replied that she, too, had not felt sure of the correctness of the determination until she had written Dr. Riley a second time with reference to the species, and the determination had been reaffirmed. This appeared to settle the matter, and I was satisfied that *napi* must be correct, though not before known to occur in North America.

In Bulletin 22, Division of Entomology, United States Department of Agriculture, p. 73, Miss Murtfeldt mentions *Ceutorhynchus rapæ*, Gyll., but does not state whether or not it is the same insect that had been previously mentioned, and there is nothing to imply that such was the case.

In Bulletin 30, of the same series, p. 50, mention is again made of *Ceutorhynchus rapæ*, and this time in a manner that might imply that it was identical with *napi*, but there is nothing definite to this effect, though a correction might have been made in either this or the reference previously cited. Miss Murtfeldt was clearly going by the information given her from the Department of Agriculture, and any errors in that information would not be hers, but of the Division of Entomology, whose place it was to make proper corrections of such, even though of a clerical nature, as a matter of justice to the many who looked to the then United States Entomologist as authority on such matters.

Last May I received young cabbage plants from Montgomery County, Ohio, that were being destroyed by larvæ of some insect burrow-

ing in the stem, especially in the upper portion thereof. I found the larvæ difficult to rear in confinement, and only succeeded in securing one adult from plants removed to the insectary June 14. Correctly supposing that I was dealing with the same species as had Miss Murtfeldt, and overlooking her note in Bulletin 30, I presented the matter in my "Notes of the year in Ohio," at the last meeting of the Association of Economic Entomologists, under the name *C. napi*, Gyll., coupled with the statement that it was not in Henshaw's lists, and in this condition my paper was placed in the hands of the Secretary for publication. My single specimen, reared from affected plants, did not exactly correspond with my specimens of *rapæ*, and remembering the double determination by Dr. Riley for Miss Murtfeldt, and also not at the time having access to the latter's note in Bulletin 30, was led to a conclusion that was, perhaps, not justified, and under different circumstances would not have been arrived at by myself. I had no description of *napi* and a very poor one of *rapæ*, but the work of my larvæ corresponded so exactly with that ascribed to the former species, in Europe, as given in Bargaglia's *Rassegna Biologica di Rincofori Europei*, that I was still further misled.

Before my note went to press, however, I was informed that the old determination of *C. napi* had been found incorrect, that the species was *C. rapæ*, as was probably true of mine. I submitted my single specimen to Mr. Howard, the present U. S. Entomologist, with the request that, if it turned out to be *C. rapæ*, my note should be changed in the proof to correspond thereto. This was all very kindly done, so far as the specific name was concerned (See Bulletin No. 2, New Series, U. S. Department of Agriculture, Division of Entomology, p. 90), but, unfortunately, the statement that "the species is not yet included in Mr. Henshaw's lists of North America Coleoptera," and which was not intended to apply to *C. rapæ* at all, but to *C. napi*, was, through an oversight, allowed to stand, thus placing me in a position that demands an explanation, and which is, here and for this reason, given. *C. napi* is not yet known to occur in America.

In the accompanying plate illustrating the development of *Ceutorhynchus rapæ*, the adult is shown, dorsal view at A, lateral view at B, the larva C, excavation in affected plant in which one or more larvæ may develop at D. The drawings were made by Miss Detmers, under my supervision, and developed at the Department of Agriculture, the electrotype being kindly furnished me by Mr. L. O. Howard.

To Miss Murtfeldt belongs the credit of working out the life-history so far as this is now known, my own observations being only supplementary. Miss M. records the occurrence of larvæ, supposedly belonging to this species, in early spring burrowing in the stems of pepper-grass (*Lepidium virginicum*), and also in the same plant in July, thereby implying at least two annual broods. The injury to cabbage, as observed by her, appears to have been confined to early plants either in hotbeds or soon after having been removed therefrom. In the case of the Ohio outbreak, the attack was among young plants started late for fall and winter use. My attention was not called to the exact trouble until June 4, and both larvæ and adults were taken from these plants July 18, so that I seemed to have been dealing with the second brood. The plants were growing on low ground bordering on a pasture, and the latitude was nearly the same as that of Kirkwood, Missouri, where Miss Murtfeldt's studies were carried on. It is, of course, quite possible that the period of oviposition is protracted, and that I was dealing only with the latter part of the first brood.

REMARKABLE WORK OF INSECTS.

At the meeting (of February 3rd) of the Academy of Science, of St. Louis, Mo. (President Gray in the chair), Mr. Trelease exhibited several specimens, about three feet square, of a curious silk tapestry, taken from the ceiling of a corn-storing loft in San Luis Potosi, Mexico, by Dr. Francis Eschauzier, stating that he was informed that the larger specimen had been cut from a continuous sheet over twenty yards wide and about four times as long. The specimens, of a nearly white colour, and of much the appearance and feeling of a soft tanned piece of sheepskin, were shown to be composed of myriads of fine silken threads, crossing and recrossing at every conceivable angle, and so producing a seemingly homogeneous texture. Although specimens of the creatures by which they are produced had not been secured, it was stated that there was no doubt that these tapestries are the work of lepidopterous larvæ which feed upon grain, the presumption being that they are made by the larvæ of what has been called the Mediterranean Grain or Flour Moth (*Ephestia Kühniella*). The speaker briefly reviewed the history of this insect and its injuriousness in various parts of the world, and quoted from a report of Dr. Bryce, showing that in Canada, where it became established in 1889, "a large warehouse, some 25 feet wide, 75 feet long, and four stories high, became literally alive with moths in the short course of six months." WILLIAM TRELEASE, *Recording Secretary*.

A FEW NEW SPIDERS.

BY NATHAN BANKS, SEA CLIFF, N. Y.

Micaria gentilis, n. sp.

Length, 3.6 mm.; ceph.: long, 1.4 mm.; broad, 1 mm. Cephalothorax, sternum, femora i. and ii., blackish; rest of legs i. and ii. pale yellowish; legs iii. and iv. yellow-brown, the femora scarcely darker; abdomen black above, with a narrow white band across the middle and a white spot on each anterior lower side; venter pale. Cephalothorax broad, in ♂ a little narrower; posterior row of eyes procurved, the P. M. E. oval, fully their diameter apart, and about as far from the P. S. E.; anterior row strongly procurved, the A. M. E. fully their diameter apart, and about as far from the larger A. S. E. Sternum oval, pointed behind; legs of moderate length, femora i. and ii. stouter than others, femora iii. slightly excised before the tip behind. Abdomen not constricted, quite broad, somewhat depressed, epigynum appearing much like *M. montana*, Em., but the openings are farther apart and more oblique. Tibia of ♂ palpus has short projection at tip on the outer side; the bulb is triangular in side view, the red parallel marks are along the outer edge; near the middle is a short tube.

Several specimens from Franconia, N. H. [Mrs. Annie T. Slosson]. Related to *M. perfecta* from Colorado, but larger and with a broader sternum.

Scius montanus, n. sp.

Length, 2.1 mm.; ceph.: long, 1 mm.; broad, .6 mm. Jet black, shining, almost coppery; extreme tips of palpi, tips of maxillæ, a spot on each coxa and trochanter, and an elongate spot on the femur, pale; the tarsi infuscated; pale dots on legs at origin of hairs. Cephalothorax long, moderately low, nearly flat, sides almost parallel. Eye region one-third broader than long, occupying not much over one-third of the cephalothorax; a trifle broader in front than behind; eyes of second row full as close to the dorsal eyes as to lateral eyes; A. M. E. large, distinctly separated, plainly farther from the S. E. Sternum one-fourth longer than broad, broadest in middle, pointed behind, truncate in front; coxæ i. separated by full width of lip; legs short, fourth pair longest, femora i. thicker than others; only a few indistinct spines, those on metatarsi iv. are at apex. Abdomen barely wider than cephalothorax and but little longer, pointed behind. Body and legs clothed with scattered black hairs. The ♂ palpi short, the tibia with a short process on the

outer side, twice as long as wide, and appressed to the tarsus so as to be hardly visible except in side view; palpal organ very large, with the lower part full and extended over the base of the tibia; on the outer side near tip is a crescent-shaped yellowish mark; the bulb is small and on one side, and is tipped with a minute spine-like tube.

One ♂, Mt. Washington, N. H. [Mrs. Annie T. Slosson]. A very distinct little species, and doubtless peculiar to mountains.

Dismodiscus alpinus, n. sp.

Length, 2 mm. Cephalothorax pale yellowish, blackish around eyes, sternum infuscated, abdomen dark gray, legs almost white. Structure somewhat like *Loph. decem-oculatum*, Em., with a large lobe on the clypeus as in that species, but the lobe on the head is higher, narrower, rounded above, not bilobed, clothed with short hairs on top and in front, and rises suddenly from the surface of the cephalothorax in front and behind; the P. M. E. are on the cephalothorax at its base, and not on the lobe; the holes are in a large groove on each side. The posterior row of eyes is straight, equal in size, the P. M. E. fully as far from each other as from the S. E.; the anterior row is slightly recurved, the A. M. E. very small and close together. Sternum but little longer than broad, truncate at base, pointed behind, sides rounded. Legs slender, a spine above on patella and two on tibia iv., tarsus i. plainly shorter than the metatarsus. The tibia of the ♂ palpus has above two short spines and two projections at its tip, the outer one the broader and pale, the inner one more pointed and reddish; the palpus is barrel-shaped, the tube going once around the tip as in *Diplostyla*; there is a large curved hook at base.

One ♂, Mt. Washington [Mrs. A. T. Slosson]. Although this species does not strictly agree with Simon's description of the genus *Dismodiscus*, I believe it should go here, as also *Loph. decem-oculatum*, Em. The best character for the genus to me is the clypeal lobe.

Dicyphus, Menge, which Simon unites to *Gonatium*, I would agree with Kulezynski in keeping as a separate genus, and closely related to *Dismodiscus*. The head of the ♂ has a lobe above which does not bear the P. M. E.; there is no clypeal lobe. I have seen two species from the United States, the first of which has much affinity with the type of the genus, *D. bituberculatus*.

Dicyphus bilobatus, n. sp.

Length, ♂, 2 mm. Cephalothorax orange, a little black around the

eyes, the lobe on top yellow, a black line from the hole on each side; abdomen blackish above and below, the spinnerets pale, sternum yellowish, legs and palpi pale, clothed with fine hairs. Just behind the eyes is a large bilobed body with a hole at base each side; seen from above each lobe is elliptical, and scarcely twice as long as broad, shorter than in *D. bituberculatus*. Posterior row of eyes nearly straight; P. M. E. once and a half their diameter apart, slightly farther from the S. E.; A. M. E. very small and about touching. Sternum as broad as long, triangular; legs moderately long, no spines above on tibiae, tarsus i. shorter than metatarsus. The tibia of ♂ palpus has a long projection above near tip, much as in *D. bituberculatus*, but it is more slender, more straight and but little curved at tip; on the outer side of tibia is a very small hook-shaped appendage; the tube is moderately long, bent in the middle, and the tip supported by a hyaline sheath. The palpi are comparatively small.

Two males, one from a deep swamp near Ithaca, N. Y., the other from Olympia, Wash. [Trevor Kincaid].

Dicyphus trilobatus, n. sp.

Length, ♂, 2 mm. Cephalothorax yellow-brown, black about the eyes, lobe yellow; abdomen black, with a few light cross-lines near tip; sternum and venter black; the spinnerets pale; legs and palpi yellowish, a little brown on the coxae. Posterior row of eyes straight; P. M. E. twice their diameter apart, much closer to the S. E.; A. M. E. close together, not so very much smaller than the S. E. Just behind the eyes is a large triangular flat body, trilobed in front, the lobes of about equal size. The sternum is broad, projecting between the hind coxae, the sides rounded. Legs moderately long, hairy, no spines on tibiae. The ♂ palpi are long and slender, the tibia has above a large bifid process; there are two tube-like pieces: one, starting from near the middle of the bulb, bends out and then toward the tip of the palpus; the other, starting from near the inner tip of bulb, extends toward the base of the first one; on the outer side there is a quite prominent pale-coloured projection—it is somewhat like a sheath or support for the tube.

One specimen from Ithaca, N. Y.

The genus *Erigonoplus* has the head lobed as in the preceding genera, but differs from them at once in having the anterior metatarsi of the male swollen.

Erigonoplus gigas, n. sp.

Length, 2.2 mm. Cephalothorax yellowish, black around the eyes and on the clypeus; legs and palpi pale, patellæ of legs a little darker; abdomen blackish, with narrow pale chevrons above, spinnerets pale; sternum yellow-brown. Head broad and swollen in front; posterior row of eyes slightly procurved; P. M. E. nearly twice their diameter apart, about as far from S. E.; A. M. E. far in front of P. M. E., small and close together. Behind the eyes there is a small, low, yellow body, trilobed in front and with a smaller lobe on each side. The legs are long and hairy, without spines above; metatarsi i. much enlarged in the middle, fusiform. The sternum is short, pointed between the hind coxæ, fully as broad at coxæ ii. as in front. The tibia of the ♂ palpus has on the outer tip a short, stout projection; a large hook across basal part of bulb with a projection outward from it; the tube starts from near the middle, curves along the bulb to the tip, then extends outward and curving, so as to nearly form a square.

One male from a deep and cold swamp near Ithaca, N. Y. (May).

A REPLY CONCERNING NOCTUA AND AGROTIS.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

Prof. John B. Smith on page 8 of this volume criticizes my rejection of the terms *Noctua* and *Noctuidæ* and says: "I state my own knowledge as follows: In Scudder's 'Nomenclator' we find

"Noctua, Klein, Moll., 1753.

Noctua, Fabr., Lep., 1776.

Noctua, Sav., Aves., 1809.

Noctuæ, Linn., Lep., 1758."

I may say, that were this "knowledge" the utmost we could attain to, my statement that "Noctua is preoccupied in the Birds" would be justified. The term "Noctuæ, Linn.," 1758, is, according to Prof. Smith, to be rejected and the generic term is to be credited to Fabricius, although Guenée and others write "Noctua, Linn.," so that the date 1758 would be ruled out. The citation "Noctua, Fabr.," 1776, if looked up, would show that it represents a bare name, and therefore [see Comstock's observations] this would also fall. We would then come to Savigny, 1809, and this would be the proper use under the rules, according to the "Nomenclator" as cited by Smith, of the name "Noctua." But while Prof. Smith's knowledge, as above stated, justifies me, it is not final.

Prof. Comstock finds that Fabricius in 1792 uses "Noctua" for 380 species, and this is not in the "Nomenclator." More than this, I have found that Fabricius uses the term "Noctua" for 309 species already in the Mantissa, 1787.* So that we are getting more light and more facts, and it may be that my rejection, although warranted by the "Nomenclator," may have to be reconsidered. But there remains the fact that the type is unknown [pending what we may hope to hear from Mr. Kirby's researches] and, also, that no author is obliged to use a generic term which has not a properly designated type. In this case I have shown at least the necessity for reviewing Guenée's statement, that *his* genus "Noctua" is a proper restriction of the Linnean term.

And now as to *Agrotis* and Prof. Smith's statements on page 6. He does not quote my full text on p. 16 of the Bremen List, where I show that he copies the sense and as near as may be my words as to the characters on which we may divide the genus, without any acknowledgment. He excuses the omission now by the "bald statement" that the contents of my paper† were not "in any sense of the word original," and that Lederer used the characters in his work on "the European Noctuids so long ago as 1857." This is the first I have heard that Lederer had worked up the American Agrotids; it would have spared me much trouble had it been so. In reality Lederer only discusses the European species, and my work on the American and my suggestions as to the characters to be found serviceable was in so far original. But the statement that the characters proposed and observed by me were not "original" seems incorrect. First: Lederer does not propose to use the unarmed fore tibiae as an excluding character. He alternates groups of the species with armed and unarmed tibiae.‡ So that I should have been credited for this original suggestion. Second: I am the first to discover the tuberculate front in *Agrotis*; this discovery is "original" and it does not detract from its originality that I only applied *Carneades* to the two species which I examined and only could examine at the time of my discovery, I being then very ill and having parted with my collection. That some of the European species probably have the tuberculate front is implied by Prof. Smith when suggesting that *Chera* should replace *Carneades*. But Lederer does not mention the clypeal tubercle or elevation at all.

* Grote, Die Apateliden, Mitt. Roem. Mus. San., 1896.

† CAN. ENT., XV., 51, 1883.

‡ Lederer, Syst. Noct., p. 81. I have constantly in my writings given Lederer every credit for his observations on the characters in this family.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XV. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC.

The above family is of immense extent and attains, in the tropics, a considerable development in the size of its members, though not equalling in this respect its wood-eating neighbours, the Cerambycidæ. Towards the north, many groups fade out entirely and the large or gaily-coloured species decrease in number. Nevertheless, the representation in Canada is quite considerable, and since many of the species are closely allied and separate with some difficulty, while tables of genera are widely scattered, or, in many cases, not readily accessible, it has been deemed worth while to bring together the salient characters by means of which the collector in Eastern Canada may hope to identify his captures.

According to the classification followed in this country, the members of the family agree in these points: The tarsi are broad, spongy beneath, the fourth and fifth joints being so closely anchylosed as to give the appearance of but four joints; the head has the front small and oblique, the antennæ are moderate or short and not inserted upon frontal prominences. The prothorax is most frequently margined and the tibial spurs usually wanting. A few exceptions occur to each of the above characters, but most of the Chrysomelidæ may easily be recognized at sight by their resemblance to a few common types, such as *Donacia*, *Cryptocephalus*, *Chrysochus*, *Chrysomela*, *Galeruca*, *Haltica*, *Micro-rhopala* and *Cassida*. There is, however, no uniformity of family habitus, as many of the Cassidini are extremely broad and flattened, while the Cryptocephalini are occasionally nearly globular.

All of the Chrysomelidæ may be said to be vegetable feeders, and most of them are to be found in every stage upon the leaves, in the stems or about the roots of their food-plants. The larvæ are not of a very uniform type of structure, but are modified to suit their particular habits of life. Most of those that feed freely upon the surface of leaves are of rather heavy, subcylindrical or subglobular form and slow in movement. A good example of this type is to be seen in the young of the Colorado potato-beetle. Other leaf-eating larvæ, such as those of *Coptocycla* and its allies, are flattened and curiously armed with spines or covered with a coat of their own excrement. The leaf-mining or stem-boring kinds are usually of more slender, elongate shape and without the conspicuous

ornamentation displayed by so many of the free-feeding forms. A few are case-bearers and occur either at large on their food-plants or in nests of ants; to this category belong *Coscinoptera* and *Chlamys*. The larva of *Chlamys plicata* occurs commonly on grasses in the Lake Superior district, carrying its little case about and protruding only the front part of the body when feeding or crawling. When the inhabitant is ready to pupate, the open end of the case is sealed to a blade of grass and the transformations take place within.

The economic importance of the group has been recognized by all Entomologists, and certain species claim their share of our crops from year to year in spite of the constant war waged against them. The imported elm-leaf beetle, the Colorado potato-beetle, the corn-root worm, and the striped cucumber-beetle are only a few of the many injurious Chrysomelidæ which have to be fought each year in the regions which they infest.

Secondary sexual characters are to be found in the antennæ, the tarsi, the claws, and the ventral abdominal segments of many species, and are often of great value in the separation of otherwise almost indistinguishable forms. These will be referred to in the proper places when necessary for identification.

On account of the great size of the family, it seems best to avoid a long, complicated generic table by the adoption of the groups indicated in the Leconte and Horn "Classification." Each tribe will be taken up by itself and the genera contained in it separated by a table. A slight modification of the tabular synopsis presented in the work above cited may be used to advantage as follows:—

- A. Outline of body elliptical or nearly circular; prothorax and elytra with broad expanded margins, head concealed. . . . XI. *Cassidini*.
- AA. Outline of body variable, prothorax and elytra without broad expanded margins. Head usually plainly visible from above.
 - b. Front of head inflexed, mouth inferior, body wedge-shaped, broad and truncate behind. X. *Hispini*.
 - bb. Front of head not inflexed, mouth anterior.
 - c. Last dorsal abdominal segment not exposed, middle ventral segments not narrowed.
 - d. Prothorax usually margined.
 - e. Antennæ approximate at base; front coxæ conical and prominent IX. *Galerucini*.

- ee. Antennæ widely separated at base.
 Front coxæ transverse, third tarsal joint usually
 entire VIII. *Chrysomelini*.
 Front coxæ rounded, third tarsal joint
 bilobed VII. *Eumolpini*.
- dd. Prothorax not margined at sides.
 f. First ventral about as long or somewhat shorter than
 the two following.
 Claws simple, elytra punctato-
 striate III. *Criocerini*.
 Claws cleft or toothed, elytral punctures
 irregular II. *Sagrini*.
- ff. First ventral about as long as all the others
 united I. *Donaciini*.
- cc. Last dorsal abdominal segment exposed, declivous. Form
 of body robust, compact, subcylindrical.
 g. Surface of body coarsely tuberculate
 above V. *Chlamydini*.
 gg. Surface of body not tuberculate.
 Prosternum not separating front coxæ; antennæ
 short and serrate IV. *Clythrini*.
 Prosternum extending between front coxæ, antennæ
 usually long and slender VI. *Cryptocephalini*.

The Roman numerals before each tribal name show the order in which they are taken up in the following pages.

TRIBE I.—DONACIINI.

Contains two genera, which are composed of very neat, graceful and usually active species, found on or about such aquatic or subaquatic plants as water-lilies, arrowheads (*Sagittaria*), pond-weed, and various sedges. They have a habitus peculiarly their own, which if once appreciated renders their future recognition easy at a glance. The head and thorax are narrower than the elytra, which are attenuated toward the tip—sometimes almost triangularly so. The antennæ are rather long, extending back beyond the base of the thorax; the under surface of the body is finely pubescent. In colour most of the species are metallic, varying to blue or green, though a few are testaceous, at least in part.

Elytra simple at tip *Donacia*.

Elytra distinctly spinose at tip *Hemania*.

DONACIA, Fabr.

Numerous Canadian species are known, which, from their general uniformity of appearance, are often difficult to identify. Careful attention to the points recently elaborated by Mr. Chas. W. Leng, and published by him in a late paper on the genus, should result in correct names, however. The following table is based on that of Mr. Leng, though I have changed the arrangement somewhat, in order the sooner to eliminate the more easily recognized species :—

- A. Head, thorax and elytra pubescent. .40-.44 in... *pubicollis*, Suffr.
- A A. Head and thorax pubescent, elytra glabrous.
 - .36-.44 in.... *hirticollis*, Kirby.
- A A A. Head sometimes, thorax and elytra never, pubescent.
 - b. Elytra distinctly rounded at tip ; form convex.
 - c. Thorax depressed, no median nor basal line.
 - .24-.32..... *pusilla*, Say.
 - cc. Thorax convex, basal line distinct, longitudinal one usually so.
 - d. Legs dark ; body usually metallic blue.
 - .24-.28 in..... *emarginata*, Kirby.
 - dd. Legs reddish-yellow. Body usually copper-bronzed.
 - Thorax thickly punctured. .28-.36 in. *flavipes*, Say.
 - Thorax sparsely punctured. .26-.30 in... *rufa*, Say.
 - bb. Elytra truncate or subtruncate at tip.
 - e. Middle coxæ separated by about their own width ; body broad, distinctly flattened above.
 - f. Second and third joints of antennæ nearly equal.
 - .28-.44 in..... *cincticornis*, Newm.
 - ff. Third joint of antennæ much longer than second.
 - Elytra truncate at tip. First ventral ♂ simple.
 - .36-.44 in..... *palmata*, Oliv.
 - Elytra subtruncate at tip. First ventral ♂ with a pit at middle. .26-.40 in..... *piscatrix*, Lac.
 - ee. Middle coxæ separated by less than their own width.
 - Body usually convex above, narrower than in preceding group.
 - g. Prothorax scarcely tuberculate at sides, surface with coarse uniform punctures.
 - .28-.44 in..... *subtilis*, Kunze.

gg. Prothorax tuberculate at sides, disk uneven.

Sutural margin of elytra not sinuate, disk with two transverse indentations. .22-.28 in. *aequalis*, Say.

Sutural margin of elytra sinuate near the tip. .28-.36 in. *distincta*, Lec.

It will be noted that several of the names on the Canadian list do not appear in the above table. These have been reduced to synonymy by Mr. Leng, as follows: *D. cuprea* becomes *pusilla*, *D. rugifrons* gives way to *emarginata*, *D. jucunda* to *flavipes*, and *D. Kirbyi* to *rufa*.

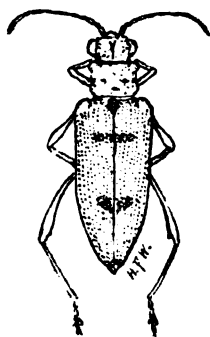


FIG. 4.

Both *proxima* and *magnifica* are considered by him to rank only as varieties of *cincticornis*, *proxima* having the prothorax punctate only at base and apex, while in *magnifica* it is coarsely punctured over the whole surface. He reduces (with an expression of doubt) *torosa* to a varietal form of *distincta*, from which it differs by Dr. Leconte's description in being of a blackish-violet colour and in having the prothorax somewhat elongate, while the same author describes his *distincta* as coppery, with the thorax quadrate. It is a matter of remark that Mr. Crotch should have placed these forms in different and

apparently well-founded divisions in his synopsis, while Mr. Leng thinks them only varietal. Fig. 4 shows the form of body common in the genus.

HÆMONIA, Latr.

The only North American species is *H. nigricornis*, Kirby, which resembles a small *Donacia* in form. Beneath, the body is blackish, the upper surface and the legs are reddish-yellow. The head, antennæ and tarsi are dark. The elytra are marked with ten long rows of punctures and a shorter one near the suture at base. Length, .20-.28 in. It is said to occur on *Potamogeton*.

TRIBE II.—SAGRINI.

The few species comprised in this group are remarkable for the plasticity of their characters and the difficulty of accurately defining their limits of variation. They are of small or moderate size and agree in having strongly punctured elytra, which are wider than the thorax. The mouth is rather prominent, the eyes very convex, giving the head a width

about equal to that of the thorax. The antennæ are moderately distant at base. The armature of the thorax will serve to differentiate the Canadian genera thus :—

Sides of prothorax much rounded and rather suddenly narrowed behind, giving a somewhat bell-shaped appearance. *Orsodachna*.
 Sides of thorax with large, distinct tubercle; small species. *Zeugophora*.
 Sides of thorax broadly angulate, more or less distinctly three-toothed; larger species. *Syneta*.

ORSODACHNA, Latr.

A single species of extreme variability (*O. atra*, Ahr.), belongs here. It is common on willow blossoms in spring, several colour-varieties often occurring together on the same tree. All intergrades are known, from entirely blackish individuals, through forms in which the thorax becomes red, with or without a central dark spot, to those with vittate elytra or even of an almost uniform testaceous. From the notes of Dr. Horn, the following key has been constructed as a guide to the best-marked varieties, but it must be borne in mind that numerous intergradations will be met with, not referable to any of these :—

A. Elytra blackish.

Thorax blackish, legs dark. *atra*, Ahr.

Thorax blackish, tibiæ and femora testaceous. *tibialis*, Kirby.

Thorax reddish, with central dark spot. *luctuosa*, Lec.

Thorax entirely red. *hepatica*, Say.

AA. Elytra vittate or spotted.

Elytra dark, each with narrow yellow

stripe. *vittata*, Say.

Elytra yellowish, with sutural and lateral dark stripe. *trivittata*, Lac.

Elytra dark, with humeral and apical yellow spot (Fig. 5). *Childreni*, Kirby.



FIG. 5.

In general, they agree in these characters: The prothorax is somewhat bell-shaped, rather coarsely punctured, less so at the sides; the elytra are broad at base and with numerous closely placed, rather coarse punctures which show some slight tendency to a serial arrangement. Sides of elytra nearly parallel to about the apical third, whence they are rounded to tip. Length, .16-.28 in.

ZEUGOPHORA, Kunze.

Three are reported from Canada. They are small insects, somewhat of the form of *Orsodachna*, but proportionately shorter and more robust. The punctuation, especially of the elytra, is coarse and the prothorax has a large tubercle on each side. *Z. abnormis*, Lec., is black above, the antennæ and legs red; it reaches the length of .16 in. *Z. varians*, Cr. (Fig. 6.), is a trifle smaller (.13-.14 in.), and rather prettily coloured, the thorax being mostly piceous above, with a yellowish median stripe; the elytra are dark around the margins, the disk being occupied by a large oval or somewhat heart-shaped yellowish spot. Specimens of *Z. varians* from the Pacific slope seem tolerably constant in having the median yellow stripe of the thorax obliterated and the sides more broadly pale, while the elytra have, in addition to the usual spot, a smaller common sutural one of the same colour, near the tip. This is connected with the anterior one by a narrow yellow line. *Z. puberula*, Cr., differs from *varians* in having the thorax entirely yellow, the elytral yellowish area ill-defined. The punctures are close together, the outer joints of the antennæ black. A specimen has been sent from Toronto by Mr. Crew.



FIG. 6.

SYNETA, Esch.

Represented by *S. ferruginea*, Germ. (.30-.32 in.), a yellowish or reddish-yellow beetle of rather coarse sculpture. The thorax is angulate, with three more or less well-marked teeth on each side. The elytra are marked with four costæ of various degrees of distinctness. It is often beaten from hazel thickets.

TRIBE III.—CRIOCERINI.

A few Canadian beetles of neat form and usually striking coloration belong here. The thorax is much narrower than the elytra, which are punctate in rows. The two genera differentiate easily, thus, so far as the species under consideration are concerned:—

Prothorax with a constriction about the middle, elytra striped.. *Lema*.

Prothorax cylindrical, elytra spotted..... *Crioceris*.

LEMA, Fabr.

L. trilineata, Oliv. (Fig. 7), is the only Canadian species. It is of a

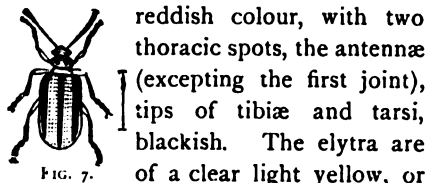


FIG. 7.

reddish colour, with two thoracic spots, the antennæ (excepting the first joint), tips of tibiæ and tarsi, blackish. The elytra are of a clear light yellow, or nearly white, with a common sutural black stripe, and each with a narrow submarginal vitta of the same colour.

Length about .25 in. (Fig. 8: *a a*

represent the larva with its singular covering of excrement, *b* the last joints of the abdomen, *c* pupa, *d* the eggs.)



FIG. 8.

CRIOCERIS, Geoff.

Two imported European species are known from the adjacent regions, though but one of these seems to have been actually reported from Canada. They prey upon asparagus, and from the striking pattern of

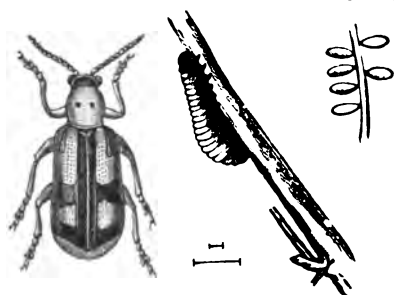


FIG. 9.

coloration are easily known. *C. asparagi*, Linn., is from .16 to .24 in. long, of a greenish or bluish-black colour, the thorax red with two black spots of variable size usually present. The elytra are reddish-yellow, with a blue-black cross formed by the crossing of a longitudinal sutural stripe and transverse median band, and with an

apical and basal spot of the same dark colour on each; or they may be blue-black with the outer and apical margin and three spots on each yellow. (Fig. 9 represents the eggs, larva and beetle much magnified.)

C. 12-punctata, Linn., is .19-.24 in. long, dull red, each elytron with six black spots of variable size. The antennæ, knees, and tarsi are also black.

I desire to acknowledge the kindness of Mr. W. S. Cody, B. A., of Windsor, Ont., in contributing a Canadian specimen of *Argynnis Idalia* to the Society's collection. I am indebted to Mr. Wm. Lochhead, of Napanee, Ont., for the information that this handsome butterfly has been added to the Canadian List. J. ALSTON MOFFAT, Curator.

CANADIAN HYMENOPTERA, NO. 7.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

The object of this paper is chiefly to record some observations, made last summer, on a few parasitic forms, but mention is first made of two phytophagous species.

STRONGYLOGASTER ? MARGINATA, Prov.

Selandria marginata, Prov., Add. Faun. Hym., 1885, p. 8.

Eriocampa marginata, Prov., Cresson, Cat. N. Am. Hym., 1887, p. 162.

Strongylogaster primitivus, MacG., CAN. ENT., 1893, Vol. XXV., p. 241.

Tenthredopsis primitivus, MacG., CAN. ENT., 1894, Vol. XXVI., p. 327.

Mr. MacGillivray has recently kindly sent to me one of his types of *primitivus* for comparison with that of Provancher's *marginata*, and I find, as was already evident from the description, that it is the same species. The generic position of the species is, however, not so readily determined; Mr. MacGillivray being now of opinion that it belongs neither to *Tenthredopsis*, *Strongylogaster* or *Taxonus*, but probably to some yet undescribed genus. It certainly does not belong to *Tenthredopsis* as adopted by Cameron in his monograph of the British Phytophaga, nor to *Selandria*, so that I have left it for the present in *Strongylogaster*, to some of our accepted species of which it is very similar in appearance. Several of the groups of our *Tenthredinidæ* require revision, the classification of species solely from wing venation being unsatisfactory, for in the phytophagous hymenoptera the venation is much more unstable than in the other divisions of the order. I fear, for instance, that Mr. MacGillivray's genus *Bivena* (CAN. ENT., Vol. XXVI., p. 327) has been founded upon the accidental occurrence of a supplementary marginal cell.

CEPHUS PYGMÆUS, Linn.

The continued spread of this wheat-stem sawfly is evidenced by the occurrence of two males in a small collection made on 5th July, at Indian Head, Assa., by Mr. Fletcher, during his trip to British Columbia last summer.

PEZOMACHUS PETTITII, Cresson, CAN. ENT., 1892, Vol. IV., p. 61.

Pezomachus sulcatus, Prov., Add. Faun. Hym., 1885, p. 77. ♀.

Stibeutes Pettitii, Cr., Riley and How., Ins. Life, 1890, Vol. p. 154.

This is the commonest species of our wingless Cryptids, but I have noted only one mention of its having been bred, which is in the list published in *Insect Life* (*loc. cit.*) of bred parasitic hymenoptera in the United States National Museum, the record being as follows:— "*Bucculatrix* found on stone, Virginia, April 9th." The species is there referred to the genus *Stibeutes*, which in Cresson's synopsis is said to have the "Metathorax completely and regularly areolated," while in *Pezomachus* it is "not, or irregularly areolated." None of my specimens show any areolation, the indications of any metathoracic carinæ being of the feeblest nature. This insect has frequently been taken with the sweeping-net on foliage from June to September, and on one occasion in the latter month, as I was reclining under a pine tree, near Aylmer, I observed numerous examples running about on the carpet of dead pine leaves which covered the ground. They had a remarkable resemblance to some of the ants which are always roaming around in such places. Last April I obtained, under a large flake of loose bark on an elm stump, a number of egg-cocoons of an undetermined spider. They were hemispherical in shape, and made of a very white silk, and were covered by irregular tent-like masses of the same flocculent, viscid silk, spun between the bark and the surface of the wood. On opening one of the egg-masses I found two hymenopterous larvæ among the yellow eggs, and therefore secured a number of the cocoons, which, when removed, adhered to one another and formed a sticky mass in the small box in which I had to place them. Two of the parasites emerged on May 19th, and proved to be males of a *Hemiteles* not in my collection. Two days later a similar winged male appeared, and also three wingless males, which I saw belonged to *Pezomachus Pettitii*. Four wingless males, one winged male, and one female emerged the following day, and others followed until, in all, I obtained four females, seven wingless males, and six winged males. There can be no doubt that the winged forms, though differing in the shape of the thorax from those without wings, are specifically the same. This rearing confirms the opinion held by many authors [For example see Walsh, *CAN. ENT.*, Vol. II., p. 10.], of the identity of the genera *Hemiteles* and *Pezomachus*, and I have special pleasure in recording it at the present time, in view of the following recent reference to the subject by Dr. Sharp (*Cam. Nat. Hist.*, Vol. V., p. 556): "The little *Ichneumons* of the genus *Pezomachus* are quite destitute of wings, and somewhat resemble ants; they are quite common

insects in Britain. Only the female sex is known, and it is believed that the winged Ichneumons assigned to the genus Hemiteles, of which no females are known, are the males of *Pezomachus*. Repeated efforts have been made to place this beyond doubt, but they have usually failed, for when a brood of these parasites is reared the individuals generally prove to be either all Hemiteles or all *Pezomachus*. It is to be hoped that this interesting case will be fully elucidated." Of the American species assigned to *Pezomachus*, several are known in both sexes. Mr. Howard, for example, describes both ♀ and ♂ of *P. micaria* (Proc. Ent. Soc., Wash., Vol. II., p. 194), bred by Mr. Emerton from the egg-cocoons of a species of *Micaria*. Individuals of *P. Pettitii* vary somewhat in colour and in shape of thorax, the anterior node of which is often sulcate, as in Provancher's type of *sulcatus*. Nearly all those taken in the field have the abdomen entirely dark, except the apex of first segment, while all the bred specimens have the apex of second segment also pale. The winged males appear slightly larger than the wingless, and have the abdomen slightly more elongate, but its markings are exactly the same. The fully developed thorax is black, and the wings have a large triangular stigma of a dark brown colour. The antennæ are darker, and apparently more slender.

PEZOMACHUS OTTAWAENSIS, n. sp.

Female, length, 5-6 mm. Rufous, with abdomen in part black. Head transverse, slightly narrowed behind; occiput concave; antennæ long and rather slender, 23-jointed; face subtuberculate, as also clypeus slightly; mandibles sometimes paler, with the teeth black. Thorax binodose, the nodes subequal; the rounded metathorax not areolated, but with the posterior face flattened obliquely. Abdomen with a broad rufo-orange band covering nearly all the second segment, the petiole also rufous; the second segment narrowly black at base, and the following segments black, polished; ovipositor exerted about 1 mm., sheaths black at tip.

Described from 23 females bred, with two exceptions, from egg-cocoons of spiders. This is a large, handsome *Pezomachus*, very constant in coloration, especially of the abdomen. The base of petiole, posterior coxæ, and femora are darker in a few specimens, and the vertex of head is occasionally clouded; individuals may possibly occur with the head in part black. The egg-cocoons in which this species breeds are

flattened, scale-like objects, 10-12 mm. in diameter, adhering closely to stones, and often irregular in shape to conform to the uneven surface. When new, the silk of which they are spun is of a delicate drab shade, but weathered cocoons found in spring are of a dull, dirty gray. A single larva of the *Pezomachus* occupies each infested cocoon, and when it has devoured all the spider's eggs it spins its own elongate cocoon within that of its host. This insect must be a great check upon the increase of its spider-host, for of scores of cocoons examined in one locality last spring hardly ten per cent. had escaped infestation. Through the kindness of Mr. L. O. Howard, one of these cocoons has been examined by Mr. Nathan Banks, who pronounces it to be "almost certainly a Drassid cocoon, possibly *Micaria*, but more probably *Prosthema*." The cocoons are sometimes found on the under surfaces of stones and pieces of wood, but more frequently on the upper surface of large embedded rocks.

HEMITELES OTTAWAENSIS, n. sp.

Male, length, 5 mm. Black, with segments two and three of abdomen yellowish. Head black; palpi pale; antennæ blackish, slender, about 25-jointed, scape, pedicel and base of third joint pale. Thorax black, finely punctulate or shagreened; tegulæ pale; legs rufo-testaceous, including coxæ; the posterior tibiæ and tarsi brownish; wings as usual, stigma brown; metathorax feebly areolate, the lateral and posterior transverse carinæ more distinct. Abdomen narrow, segments two and three yellowish, remainder black.

Described from one male reared from egg-cocoon of spider. The cocoon was one of a lot, gathered at same time and locality, which yielded several individuals of the previously described species, and the *Hemiteles* is probably the male of that species. I have, therefore, given to it the same specific name. As it differs, however, in the evident, though imperfect, areolation of thorax, and in colour of abdomen, etc., it may be better to separate it for the present. The abdomen is narrower and less robust than that of the winged males of *P. Pettitii*.

MASTOCHARIS WILDERI, Howard.

Twenty-two examples of this little Chalcid were bred from a hemispherical egg-cocoon of a spider, attached to the under surface of a hickory leaf. They issued, however, from the cocoon of an *Ichneumonid*, prob-

ably a species of *Pimpla*, which had devoured the spider's eggs. The greenish-blue reflections of the head and thorax of the females, and the bright coppery gleam of the smaller males, make these little creatures, when alive and hurrying to and fro with trembling antennæ, objects of considerable beauty. Mr. Howard records the species (Proc. Ent. Soc., Wash., Vol. II., p. 299) from James Island, S. C.; Brooklyn, N. Y.; Sea Cliff, L. I.; Washington, D. C.; and Los Angeles, Cal., showing a very wide distribution.

TELENOMUS, n. sp. ?

From two eggs found attached, and side by side, on the upper surface of a hickory leaf, I obtained thirty-one individuals (25 ♀, 6 ♂) of a *Telenomus*, which appears to be undescribed, but as the genus is such an extensive and difficult one I do not care to name it. The eggs, which are those of our beautiful pale green, swallow-tailed Luna moth, are round and flattened; white above and below, and surrounded by a dark brown band. They are about 2 mm. in diameter, and not much more than 1 mm. in thickness, so that when one was tenanted by at least sixteen larvæ, their quarters could not have been over spacious. It requires somewhat careful examination of the egg to find the minute hole from which the parasites issued.

ACOLOIDES SAITIDIS, Howard.

From the same batch of spider-cocoons which produced the seventeen examples of *Pezomachus Pettitii*, there came forth, a few days later, a host of minute Prototrypids, which seem to belong to the species named as above by Mr. Howard (Ins. Life, Vol. II., p. 270), and constituted the type of his new genus; the type specimens having been bred from eggs of the spider *Saitis pulex*. My specimens differ from the description only in having the apex of the first abdominal segment yellowish. They commenced to appear on June 4th, and by the evening of June 6th there had issued 160, nearly all of which were females. The total number that came forth was 206, consisting of 162 ♀ and 44 ♂. Such figures might indicate this to be a very common insect, yet I had never met with it in my collecting. Previous records for the species are Lincoln, Neb., and Oxford, Ind.

CHRYSID NITIDULA, Fabr.

One example of this beautiful green Chrysid was bred from an almost black cocoon, which was found in a cell of *Odynerus catskillensis*,

Sauss. The Odynerus cells were built of clay, upon the under surface of a stone, and formed a compact mass which could not be removed without rupturing the cells, as their silken lining adhered directly to the uneven surface of the stone.

CHRYSIS PARVULA, Fabr.

This pretty species very closely resembles the preceding, but is easily separated by the shape of the terminal segment of abdomen, which is truncate and tridentate (the central tooth strongest), instead of quadridentate, with curved emarginations separating the teeth. Two examples were bred from cocoons taken from the cells of *Pelopæus cementarius*, Drury, the slender-bodied wasp whose large clay-built groups of cells are so frequently seen under window-sills and other ledges in the city, and are placed under stones in the fields. The cocoon of the parasite occupies one end of the cell made by the industrious wasp as a home for its own young, and is almost identical in shape and colour with that of the other Chrysid. The insects emerged on June 2nd and 4th, the cells having been obtained some weeks previously. Mr. Ashmead has recorded (*Psyche*, Vol. VII., p. 79) the rearing of *C. perpulchra*, Cr., and *C. cærulans*, Fabr., from the same host.

CEROPALES FRATERNA, Smith.

While searching, one day in early spring, for the potato-like galls which are produced by *Tribalia* upon the roots of wild roses, I found under a flat stone, slightly imbedded in the turf, about a dozen fusiform hymenopterous cocoons, about 15 mm. long. They were scattered on the surface of the soil, and some had already become mouldy from the dampness of the ground. From those which were not so affected I obtained in due time a female and four males of *Pompilus luctuosus*, Cr., which liberated themselves by neatly cutting off the large end of the cocoon. From one of the larger cocoons there emerged in the same manner, instead of the velvety-black *Pompilus*, a long-legged, yellow-banded *Ceropaes*.

AGENIA ARCHITECTA, Say.

The mud cells of this pretty little blue wasp are not uncommon under stones in dry fields near woods. They are cylindrical in shape, and several may be found on the same stone, but they are not massed together and cemented into one lump, as are those of the mud-wasps previously mentioned. The wasps have been bred several times, but I have as yet reared no parasites.

ON THE STRUCTURAL AFFINITIES OF THE GENUS DEMAS.

BY J. W. TUTT, F. E. S., LONDON, ENGLAND.

In the Journal of the New York Entomological Society, Vol. III., pp. 130-131, Mr. Harrison G. Dyar writes as follows: "Prof. E. B. Poulton has shown that dorsal eversible glands are of general occurrence throughout the *Lymantriidæ* (Trans. Ent. Soc., Lond., 1887, p. 300) on the tenth and eleventh joints (segments), or rarely only on the eleventh joint (*Dasychira pudibunda*). Probably these structures are characteristic of the family, but Prof. Poulton did not find them in *Demas*. This genus has been considered to belong to the *Noctuidæ*, but English authors assume it to be a *Lymantriid*. Mr. J. W. Tutt remarks, in speaking of Prof. J. B. Smith's recent 'Catalogue of the Noctuidæ' (Ent. Record, VI., p. 70):—"The obsolete position of *Demas* among the *Noctuidæ* is retained." Now, is this position 'obsolete?' The absence of the retractile tubercles certainly throws doubt on the matter. Now, I have shown a characteristic difference in the arrangement of the thoracic tubercles between the *Lymantriidæ* and the *Noctuidæ* (Trans. New York Acad. Sci., XIV., p. 57), and *Demas* shows the Noctuid structure. Therefore, on all essential larval characters *Demas* is a Noctuid. It might, indeed, be an Arctian, as far as the larva goes, but not a *Lymantriid*. As concerning the structure of the imago, *Demas* seems to have greater affinity with the *Noctuidæ* than any other family; in fact, it appears to me that the placing of *Demas* among the *Lymantriidæ* may properly be characterized as premature." Further, Mr. Dyar writes as follows:—"Pupa, shining dark brown with a large wrinkled cremaster and three movable incisures. Of the usual Noctuid appearance (quite unlike *Orgyia*) and passing the winter." This statement regarding the pupa must be read carefully in connection with the remarks of Dr. Chapman quoted below.

Now, I would call Mr. Dyar's attention to the following statements made by Dr. Chapman some two or three years ago. He writes:—"We now come to the two species, *Demas coryli* and *Diloba caeruleocephala*, that are certainly not very much related to each other, and though they have some indications of affinity with *Acronycta*, are not near enough to be placed in the same family. *D. coryli*, I should certainly restore to its old place in the *Liparidæ*, to which it is far closer than to the *Acronyctas*. . . . But neither of them seemed to me to be nearer to *Acronycta*

than is *Arctia* or *Liparis*, or *Orthosia*, or *Xylina*, which appear to be perhaps the families nearest to *Acronycta* in different directions" (Entom. Record, Vol. III., p. 249).

Dr. Chapman then gives (Ibid. pp. 249-251) a most exact and scientific description of the egg, the newly-hatched larva, and the larva after each change of skin, of *D. coryli*, annotating his description throughout by comparison with the *Liparidæ* (or *Lymantriidæ*, as it appears to be called by American lepidopterists).

After thus exhaustively dealing with the structure of *Demas* in its various stages, Dr. Chapman concludes:—"The larva of *D. coryli* is clearly a Liparid, not, therefore, perhaps so very remote from *Acronycta*, but, still, distinctly a BOMBYX (if that name still has a definite collective meaning) and not a NOCTUA. The pupa of *D. coryli* is not that of a NOCTUA, though the character of the anal armature has some resemblance to various NOCTUA forms" (Entom. Record, Vol. IV., p. 97). The larva is excellently drawn and figured in the same volume of the magazine (Pl. IX., Fig. 2), where the newly-hatched larva is shown $\times 20$ diams., and compared with the Acronyctids, with which it has been suggested to have certain affinities. The pupa is also figured in the same plate (Fig. 5, pupa of *D. coryli*, nat. size; Fig. 5a, pupa of *D. coryli*, showing dorsal view of armature; Fig. 5b, pupa, showing ventral view; Fig. 5c, pupa, showing lateral view;—the three latter $\times 15$ diams.

It is clear that neither Prof. Smith nor Mr. Dyar have ever seen these excellent papers by Dr. Chapman. It is equally clear that it should be the business of every lepidopterist of repute to do so. One of the greatest complaints that I have to offer against critical writers on American lepidopterology is their general ignorance of British work. Surely the *Transactions* of our leading Entomological Societies and the leading magazines should be a part of every entomologist's monthly or quarterly pabulum. If they were, one would have to complain less of misunderstanding due to a want of knowledge of all the facts bearing on the case.

I trust if Mr. Dyar or Prof. Smith should be inclined to challenge the above facts, they will read Dr. Chapman's articles first. The above are necessarily brief excerpts, and the whole bearing of Dr. Chapman's position can only be understood by reading his complete essays.

A NEW COCCID FROM TEXAS.

BY T. D. A. COCKERELL, NEW MEXICO AGR. EXP. STATION.

Aulacaspis texensis, n. sp.—♀ scale circular, $1\frac{2}{3}$ mm. diameter, very slightly convex, dull brownish-gray or sepia-brown, becoming transparent at the edges; sometimes entirely whitish. Exuviae exposed, sepia-brown, not far from central, 1st skin to one side of 2nd, but wholly on it, with some white secretion extending over the centre of the 2nd.

♀ alive, plump, dull pale greenish-orange. When dead and dry dark yellowish-brown, remaining so when boiled in soda. Outline circular, pygidial portion striated; anal orifice rather small, as far behind level of caudolateral groups of glands as they are behind cephalolateral. A marginal row of 3 or 4 longitudinally elongated pores; and a sub-marginal row of pores, the two caudad longitudinally elongate, the 3 cephalad small and round; 5 groups of ventral glands, caudolaterals 10, cephalolaterals about 16, median about 8. Median lobes wide apart, with a slight prominence between them bearing a pair of small spines. Median lobes oblique, much as in *A. bromelia*, but the long inner slope convex, with 5 very distinct serrations, counting the one which forms the tip; outer short margin with one serration. Immediately outside each median lobe, and touching it, is a spine-like plate, its tip about or hardly on a level with the tip of the lobe. Then comes a very small and low, strongly bifid 2nd lobe, then a spine, then a rather large spine-like plate, then a very low and broad trifold lobe (one might almost as well say 3 serrations on the margin), then a spine, then a spine-like plate, then two serrations, and a very rudimentary third (sometimes all three obscure), then another spine-like plate, and after a short interval another, then after a short interval a pointed prominence followed by a notch, then 3 spine-like plates at rather long intervals.

♂ scale 1 mm. long, white, tricarinate, but the lateral carinae rather feeble; exuviae very pale ochreous. The ♂ scales occur in patches on the leaves, much as in *Chionaspis exercitata*, Green.

Hab.—San Antonio, Texas, Nov. 27th, 1895, on both sides of leaves of *Sophora secundiflora*. [C. H. T. Townsend.]

The species was first collected by Mr. Schwarz; and afterwards Messrs. Howard, Schwarz, and Townsend found it very abundant near San Antonio. The plant was determined by Mr. Coville. This is the first native North American *Aulacaspis*.

PHOTOGRAPHS WITHOUT SHADOWS.

A large percentage of the half-tone reproductions from photographs, for illustrating Experiment Station Bulletins, are greatly reduced in value because of a lack of detail caused by heavy shadows, resulting from the use of opaque backgrounds near the objects photographed. To overcome

this difficulty and to make such pictures of more value to specialists working in the fields of entomology, botany, and horticulture, a device, which is the outcome of combining several well-known principles, is here represented.

Many details can be easily photographed and reproduced by this arrangement which are usually obtained by pen and ink drawings, and the personal equation entering into such work is thus eliminated.

The salient features of this device are: no shadows, accuracy of colour values and form; details and time are saved. All these features are evident from a glance at figure 11, except, perhaps, the saving of time; but after a second thought, this is also obvious, as the objects to be photographed are simply laid on a horizontal plane instead of being fastened to a perpendicular surface.

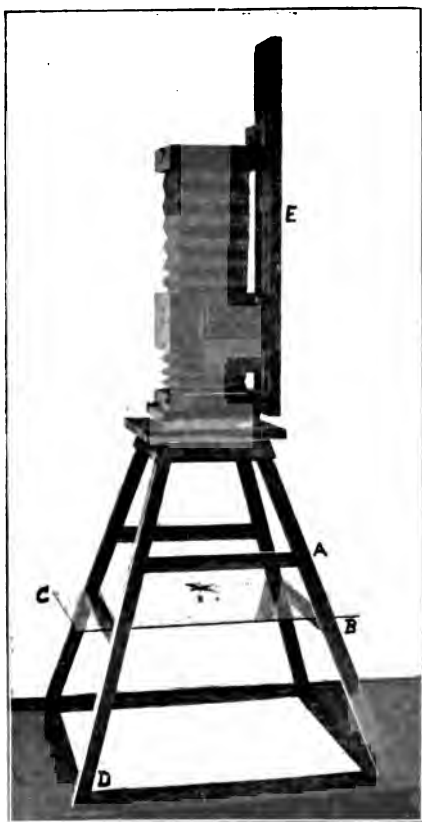


FIG. 10.

Dr. Holland, of Pittsburgh, Pa., a Lepidoptera specialist, on a recent visit to our Station, saw the arrangement and was much pleased by the advantages it offers to any of his plans for obliterating shadows in photographing butterflies and moths.

Pictures being more easily understood than descriptions, we have made a photograph of the outfit shown in figure 10, and also one showing a butterfly taken with the device, figure 11.

The apparatus consists of a four-legged stool, in this case 2½ feet high, with an opening in the top and a copying camera placed over the hole. A pane of glass (C) is now placed on the upper or lower rounds of the stool (A or B), according to the distance you wish your object to be from the lens. The objects to be photographed are placed upon the glass, and for a background a sheet of paper or other material is laid on the floor (D) under the glass. In this case a white background is used because the butterfly is principally of a dark colour. By a glance at figure 11 you will see that the objectionable shadows are obliterated.

In photographing pinned insects it is necessary to have some scheme for holding them on the glass in the position desired. This is easily done by gluing a small piece of cork on the glass surface in which to insert the pin holding the insect. It is necessary to have the cork small enough so that it does not protrude beyond the specimen when looked at through the camera.

This device can be easily modified to suit an ordinary view camera by simply adding a piece of board to the top of the stool and letting it extend in a perpendicular manner similar to E in figure 10. By having a hole in this board one can fasten a camera in place with a thumb-screw, precisely as it is fastened to a tripod, with the exception that the lens is directed downward.



FIG. 11.

W. EARL RUMSEY,
Asst. Entomologist.

West Virginia Agr. Expt. Station, Morgantown, West Va.

A NEW TYPHLOPSYLLA FROM MEXICO.

BY CARL F. BAKER, FORT COLLINS, COL.

Belonging to that group of the genus having head combs arising in front of the antennal grooves in a line nearly perpendicular to the long axis of the head, instead of along the lower margins of the cheeks, and which includes the two species *gracilis* and *fraterna*.

Typhlopsylla mexicana, n. sp.—Female. In form resembling *T. musculi*. Head rather strongly pointed, face receding. Bristles on head numerous, strong and spine-like, one on either side of extreme tip, short

and stout. Antennal groove open, spines on second joint equalling tip of joint 3. Head comb of four short, heavy spines, their tips very obtuse and sides nearly parallel; the second from above reaching as far back as tips of antennæ, and slightly longer than the others, which are nearly equal in length. Maxillæ very acute, rather broad at base. Maxillary palpi stout, the joints decrease in size in the following order: 1, 4, 2, 3, the third being shortest, the fourth narrowed to a slender tip. Mandibles reaching two-thirds length of anterior coxæ. Pronotal comb of twenty-two close-set spines. Bristles on dorsal abdominal segments in two rows, the second of ten to fourteen long and strong bristles, on ventral segments in single rows of four to eight similar bristles, the tuft on apical ventral segment rather large. Legs rather strongly spined, close-set even rows of spines on posterior margins of all tibiæ being especially conspicuous. Apical spines on hind tibiæ extending nearly two-thirds the length of first tarsal joint. In middle tarsi joint 2 equals 5, 3 is half of 1 and three-fourths of 5, 5 is twice 4. In hind tarsi joint 1 is as long as 2, 3, and one-half of 4 together, and about three times the length of 3, 2 equals 4 and 5 together, 3 nearly equals 5. Colour pale brownish. Length 2.5 mm.

Described from a single female taken from "*Mus rattus*" at Guanajuato, Mexico, by Dr. Alf. Duges. This very distinct species is easily separated from either *gracilis* or *fraterna* by the above description.

BOOK NOTICE.

Mittheilungen aus dem Roemer-Museum, Hildesheim. No. 3.—Januar, 1896. DIE APATELIDEN, von A. Radcliffe Grote, A. M. (Mit 2 photographischen Tafeln und 3 Zinkographien im Texte.)

Mr. Grote here defines the family Apatelidæ and gives a list of the species which can be referred to it with reasonable certainty in the present state of our knowledge. The subdivision of the genus *Apatela* on larval and on pupal characters is discussed at some length, and 15 subgeneric names are recognized, including both European and American species. Two of these names are new, and one new species is described, *Panthea portlandia*, Grote. The two plates represent a number of typical European Apatelidæ. The moths are excellently done, but the larvæ are only imperfectly shown, as their cylindrical bodies fail to focus sharply in the photographs.

This paper may also be consulted for a concise statement of the classification of the Lepidoptera on larval characters (page 3), and a continuation of the discussion of the generic term *Noctua* (p. 4).

HARRISON G. DYAR.

Mailed March 3rd, 1896.

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No. 4.

A CONTRIBUTION TO THE KNOWLEDGE OF NORTH AMERICAN SYRPHIDÆ.

BY W. D. HUNTER, ASS'T IN ENTOMOLOGY, UNIV. OF NEBRASKA.

[The material mentioned in this paper (with the exception of the type of *Chilosia Townsendi*, n. sp., from the collection of the Cal. Acad. of Sciences) is in either the collection of the University of Nebraska or of Prof. C. W. Johnson, of Philadelphia. In each case I have taken care to mention in which one of these the specimens may be found.]

Callicera Johnsoni, n. sp.

Male.—Eyes contiguous for about two-thirds their width above, densely long, white pilose, with a sharply defined vertical black band about one-fifth their width; above, the two bands are confluent. Occiput shining olivaceous, white pilose. Ocellar area with a tuft of ferrugineous pile. Spot above the antennæ bare, shining black. Face shining black, except the tip of the indistinct tubercle, which is opaque; covered, except an indistinct median stripe, and more densely below, with abundant long light yellowish pile; very indistinctly concave below the antennæ. Cheeks shining olivaceous, except an anterior velvety cross-band and an indistinct spot below the lowest margin of the eyes; long yellow pilose. Palpi clavate, testaceous at base, apical half black. Antennæ entirely black, with short stiff black hairs on the first and second joints; first joint cylindrical; second expanded at apex, less than half as long as the first; third joint bare, over twice as long as the first and second together, expanded on basal half, flattened, bent outwardly at middle. Style short, obtuse. Thorax: dorsum shining olivaceous, with five opaque, very indistinct, longitudinal bands; pile obscure yellowish, abundant. Pleura shining, with more distinctly yellow pile. Wings a trifle tinged with yellow anteriorly, veins testaceous. Anterior cross-vein distinctly before the middle of the discal cell. Last section of the fourth vein with the first third straight, distinctly sinuate inwardly. Tegulæ white, ciliate. Abdomen entirely covered with moderately long yellowish-white pile; first segment entirely opaque; second, except a broad cross-band, expanded medially into a large triangle, the apex of which reaches

the anterior margin, shining olivaceous ; third segment entirely shining. Legs : femora, except the extreme tips, black ; long white pilose ; tibiæ testaceous at base, at apex ferrugineous. Tarsi ferrugineous, darker at tips. L., $10\frac{1}{2}$ mm.

One specimen [Fairmont Park, Philadelphia, Pa.], collected by Mr. Chas. I. Greene and kindly transmitted to me by Prof. C. W. Johnson, of the Wagner Institute of that city, to whom I most respectfully dedicate it.

This species differs from the European *C. ænia*, Fabr., to which it is allied, in the markings of the abdomen, the absence of the "snow-white style," the general dull colour, and in several other respects ; from the only other described North American species, *C. montensis*, Snow, in not having the face and front black pilose nor the thorax and abdomen golden pilose. Mr. Snow writes me that he has never observed any variation in the colour of the pile in *montensis* at all. There are other differences in the coloration of the antennæ and legs and in the form of the fourth vein.

The capture of this insect is deemed worthy of more than passing notice. The species of *Callicera* are found almost exclusively near the tops of mountains. The only species up to the present time found outside of Europe was *C. montensis*, Snow. The three type specimens were taken on the top of Mt. Deception, in Colorado, at an altitude of 9,000 feet. Later, two more specimens were taken on one of the peaks of the Magdalena Mountains, in New Mexico, at an altitude of 9,500 feet, also by Snow. The species was described by Snow, in Kansas Uni. Quart. Vol. I., p. 33 ; July, 1892.

In Europe, as far as I have been able to ascertain, there is only one record of the capture of a *Callicera* except on a mountain top. Prof. Stein has this note in the Berlin Ent. Zeitschr., 1860, 325 [translating]: "*Callicera fulva*, Schaum.—I captured a female of this species on the first of June, in the vicinity of Frankfurt-a.-d.-O. It was resting on flowering *Spartium scoparium*, which was, perhaps, only accidental. A thorough search of the same place eight days later yielded no result."

The present is, therefore, the second record of the capture of a species of this genus at a remarkably low altitude, the altitude in this case being considerably lower than that of Frankfort-on-the-Oder, which is about 125 feet. Fairmont Park lies on both sides of the Schuylkill River, adjoining Philadelphia on the Northwest, and probably in no place exceeds an altitude of sixty feet.

The occurrence of the first discovered specimen of this European genus in the western part of North America was another verification of the well-known biological law that European forms are more likely to occur in the western than in the eastern part of this Continent, as pointed out by Snow. It is clear now, however, that since two species have been discovered, one eastern and the other western, and the eastern as closely related to the typical European forms as the western, that any such conclusion in regard to this genus is no longer valid.

Microdon fulgens, Wied.

This species was included in Williston's Synopsis of N. A. Syrphidæ, on the authority of Wiedemann, who described the species, Aussereuropæischen Zweifl., Insecten 82 (I.), from a specimen "In Berliner Museum, aus Neugeorgian," and on Macquart's statement, Dipt. Exot. Ier. Suppl., 122, of habitat as Florida and Guiana. Wiedemann's short, terse description is abundantly sufficient to separate it from its congeners. It is as follows :—

"Antennæ black. Face steel-blue, thinly yellowish-white pilose. Thorax golden-green ; in certain reflections there appear copper-coloured stripes. Ante-alar callosities (Vorflügeldreieck) steel-blue ; front between green and blue-metallic. Wings nearly pure brown, on the thin veins only brownish ; tegulæ white with a black ciliate border. Legs green or blue" [translation by Williston].

The front is mixed white and black pilose, front and middle tarsi opaque black, pulvilli light yellow. Scutellum very broad, the posterior margin almost parallel with the anterior; the spines distinct. The outer cross-veins are distinctly sinuate.

One specimen, a female [St. Augustine, Florida; Prof. C. W. Johnson], now in the collection of the University.

The robust form, entirely metallic colour, black antennæ, and large size are such as to make the species unmistakable.

Chrysotoxum derivatum, Walker.

This genus is a very difficult one, and much confusion prevails even in Europe as to the limitation of the species. Even such structural characters as the comparative length of the antennal joints are of very little value, although such an authority as Schiner has used them. They all show a very great resemblance in coloration, and the species are very variable. In Europe there are about fifteen described species, and in this country ten, one of which must be dropped on account of the imperfect description.

The material in the University collection contains numerous specimens that must be *C. derivatum*, but it is only by a process of elimination that this conclusion can be reached. As Mr. Snow states of other specimens: "They seem to belong here, however, better than elsewhere." These specimens were taken in extreme North-western Nebraska, and in the Big Horn Mountains, in Wyoming. They exhibit all the variations in the markings of the abdomen that Snow has mentioned (Kans. Uni. Quart. Vol. I., 35). Besides these, there are three specimens of both sexes—two taken at Lincoln and one at Harvard, Nebraska—that differ as follows: The anterior margin of the wings is only very lightly tinged with yellow, whereas in the others they are always very distinctly so; the abdomen is covered with erect, light-coloured pile, while in the mountain specimens it is provided with only very short black hairs; the median stripes of the thorax are very distinct, while in the others they are obsolete or entirely wanting; the four anterior femora are entirely yellow, while in the others there is a distinct black spot near the base. From this I conclude that these specimens are of a different species, which I am quite certain is *pubescens*, Loew, although the only differences in the descriptions of these two species are that in one there are distinct dorsal vittæ and the wings are tinged with brown anteriorly, while in the other these points are not mentioned, and hence, may or may not be present. But from a study of this material, part of which must be *derivatum*, I am certain that *pubescens* and *derivatum* are both good species, and should stand, no matter how many of the other species of this genus must fall. I am thus enabled to give the following amended descriptions of the two species.

C. derivatum, Walker.

Second joint of antennæ one-fourth to one-half as long as third, sometimes shorter than the first; arista yellowish. Thorax with the median vittæ at all discernable only in the female. Abdomen everywhere covered with short sparse black hairs. First segment black, second lateral margin black, except sometimes the posterior corners, the yellow band is very distinctly interrupted, the two parts arcuate and often expanded medially, posterior margin black. Band of third segment more equal in width than first, interrupted or entire, not always reaching the lateral borders, which are mostly black; entire posterior margin expanded in the middle, yellow. The black markings of the fourth segment vary from an anterior uninterrupted band, expanded to include most of the

lateral borders, and a complete arched band in the middle of the segment to a very narrow anterior band, sometimes interrupted in the middle, and not including all of the lateral margins, and an indistinct middle spot with a very slender, elongate spot at each side of it. On this segment the yellow posterior margin may be entirely separated from the anterior band, but usually they are confluent at the corners. Fifth segment with an anterior black band, expanded to include more or less of the lateral margins, and a black spot like an inverted V or Y. Often this spot is obsolete, leaving only three small spots to form the outline of a V. Legs yellow. All the coxæ, and trochanters, and a distinct shining spot at the base of each of the four anterior femora, black. Posterior tarsi tinged with reddish. Wings very distinctly brownish (less so in the female) on anterior third.

C. pubescens, Loew.

Very much like *derivatum*, but differing in having the legs entirely yellow, the abdomen everywhere covered with erect yellowish pile, and the median thoracic stripes distinct. The wings are much less distinctly marked with yellow. Second joint of antennæ longer than first; third joint in female about equal to the first two; in the male it is slightly longer. Abdomen marked like that of *derivatum*, except that the posterior margin of the second is always yellow, and the anterior corners of segments three and four are reddish. The black mark on the fifth segment is like an inverted V or Y; or the branches may be arcuate.

Psilota buccata, Macquart [Dipt. Exot. II., 2, 107, pl. xviii, fig. 2].

The history of this species and its attribution to the United States is as follows: It was described by Macquart, in the Memoirs of the Society of Arts and Sciences of Lille in 1841, and the locality given as "Carolina." It was here placed in the genus *Pipiza*. In the fifth supplement to the Dipt. Exot., which was published in 1855, Macquart describes a species, *flavidipennis*, for the first time under the genus *Psilota*, which was founded by Meigen, in his Syst. Besch. III, 256, in 1822, several years before the other species, *buccata*, was described under the genus *Pipiza*.

In 1862 Dr. Loew, in the Monographs of the Dipt. of N. A., I, 27, in mentioning the various genera of *Syrphidae* that have been recorded from North America, states that Macquart has recorded a *Psilota* from North America, but that, as that genus had been misunderstood by most authors, he would not venture to mention it among those truly represented in N. A. The reference mentioned above was undoubtedly his authority for this statement.

The next step comes in 1878, with the appearance of Osten Sacken's second edition of his Catalogue of N. A. Diptera. In that he includes *Psilota flavidipennis*, Macq., giving the author's habitat, Philadelphia, and calling attention to the note by Loew just referred to. It is very certain that if he had found the species in nature, he would have mentioned the fact. We must hence conclude that he had not, and included it simply on the authority of Macquart, which makes it very uncertain that the species is North American at all up to this date.

Between this time and the time of the publication of Williston's Synopsis it is evident that some specimens were captured in this country. For Williston states that he found two specimens in the Loew type collection which were labelled *Psilota flavidipennis* at Cambridge. Hence, it is certain from this time on that this species is a North American one, and that Macquart's locality was probably correct, as was his determination.

Now, Williston states that he has no doubt that these specimens so labelled are *buccata*, but that they are *flavidipennis* is doubtful. In other words, he thinks that the correct determination of the specimens is as *buccata*, and that Macquart's other species, *flavidipennis*, may or may not be the same as that species. Hence, in his Synopsis he places Macquart's description of *flavidipennis* along with that of *buccata*, as revised after an examination of the specimens at Cambridge.

Without assuming that my opinion will settle the matter at all, I may say that it seems that they are two distinct species. The colour of the legs and of the abdomen is quite different. The two specimens from Georgia that Williston mentions [Syn. App., 292] may and may not be the true *flavidipennis* of Macquart. It is very doubtful. The less shining abdomen would seem to favor the conclusion that they are, while the more concave face would point to an opposite conclusion.

There are known in collections specimens of this species as follows : In the Loew type collection, at Cambridge, two specimens ; in the U. S. National Museum, eight specimens, six from Texas and two from Georgia ; in Mr. C. W. Johnson's collection, at Philadelphia, several specimens from Texas ; and in the collection of the University here, one specimen from Blanco County, Texas ;—this specimen has the pile everywhere pure white.

Chilosia prima, n. sp.

Female.—*Eyes and arista bare (when magnified twenty diameters, the arista shows distinct hairs). Face not pilose, scutellum without distinct marginal bristles; legs almost entirely yellow.*

Front distinctly trisulcate, sparsely punctured, shining black, with moderately long whitish pile more abundant between the lateral sutures and the eye margin. Occiput opaque, white pubescent, except near the eye margin, where it is shining olivaceous and pilose. Face shining black; viewed from in front, covered, except broadly on the tubercle, with very fine pubescence (viewed from the side it appears bare); very deeply concave below the antennæ and indistinctly so below the tubercle, with a few short hairs between the facial sutures and the eyes. Tubercle round, subacute, shining, much more prominent than the antennal elevation, situated below the middle of the face. Epistoma not projecting, in profile obliquely truncate at apex, lower margin straight and horizontal. Cheeks narrow, coloured and provided with pile like the face. Proboscis large, flabellate, dark ferrugineous; palpi cylindrical. Antennæ and narrow margin of the orifices bright reddish-fulvous, first joint slightly darker, second with a few short dark bristles, third joint somewhat longer than broad and a little flattened above and below, large and nearly oval. Arista basal, black, micro-pubescent, not incrassate. Humeral callosities ferrugineous, inwardly silvery pollinose. Dorsum slightly metallic, sparsely punctured, more coarsely so posteriorly, with sparse erect light yellow pile. Pleura shining olivaceous, with very sparse whitish pile. Scutellum coarsely punctured, black, rather long pilose and with slightly stronger hairs on the border. Abdomen robust, distinctly expanded on segments two and three, sparsely but distinctly punctured, with short sparse yellowish pile, everywhere shining except a broad median stripe on the second segment. This stripe has a small shining area in its middle anteriorly. There is a general, almost indiscernable, purplish cast to the abdomen. Venter shining, polished anteriorly, light yellowish pilose, the apical margins of the segments reddish. Legs light fulvous, with moderately long whitish-yellow pile; middle and posterior coxæ black; the apical joint of all the tarsi, and a large spot on the outside of the posterior tibiæ, brownish. Claws black, pulvilli whitish. Wings hyaline, veins testaceous, apical cross-vein parallel to the margin of wing, meeting the third vein at an acute angle. Tegulæ and narrow base of the wing distinctly yellowish. Long. corp., 11 mm.; L. alae., 8.5 mm.

One specimen [Philadelphia, Pa., 9-4-91], collected by Prof. C. W. Johnson. The type is now in his collection.

This species falls in the group with bare eyes and arista, which includes as North American species, *capillata*, Loew; *comosa*, Loew;

nigripennis, Will. ; *versipellis*, Will. ; *parva*, Will. ; *leucoparia*, Loew ; *tarda*, Snow ; and *lucta*, Snow. From all these, except *parva*, Will., it is easily separable by the colour of the legs, which are almost entirely yellow. From *parva* it is separable by the abdominal markings as well as by the much larger size.

Chilosia Townsendi, n. sp. [To Prof. C. H. Tyler Townsend.]

Male.—Eyes bare, arista very long plumose, face not pilose, scutellum with very distinct bristles, third joint of antennæ quadrangular, one and one-fourth times as long as broad, slightly concave above, the angles scarcely rounded.

Pile of vertex long, black. Front unisulcate, very slightly shining, black pilose. Eyes contiguous for one-half their width. Antennæ small, ferruginous, apical third of third joint darker. Arista situated at extreme base of the joint, obscurely reddish, long plumose except at the extreme apex. Face covered, except broadly on the tubercle, with short appressed whitish pubescence, everywhere slightly shining, in profile distinctly concave below the antennæ. Tubercle below the middle, very obtuse, more projecting than the antennal prominence. From tubercle to epistoma, which is projecting, deeply concave. Epistoma beneath almost horizontal, in front obliquely truncate. Cheeks coloured and pubescent like the face, narrow with a transverse sulcus in the middle. Occiput olivaceous dull silvery pollinose. Proboscis very small. Humeri obscurely reddish-white pubescent. Dorsum subopaque on the side, shining, with erect black pile which grows into bristles posteriorly and laterally. Pleura shining olivaceous with erect yellowish pile. Scutellum shining, finely punctured, with very long distinct bristles on the margin and a fringe of white pile below, elsewhere it is black. Abdomen with sides nearly parallel, laterally with dense, bushy pile, which is white, except at the posterior corners of segments three and four. On the top the pile is sparse, black in the middle and yellowish at the sides. First segment entirely, narrow anterior margin of the second and third, shining metallic, fourth segment everywhere shining, but less metallic. Hypopygium shining, white pilose. Venter distinctly punctate, obscurely reddish laterally ; first segment shining white pilose and pubescent, second opaque with mixed black and white pubescence, third shining, black pubescent, and with very narrow posterior margin reddish. Legs black, mixed black and white pilose, all the trochanters, coxæ and narrow base and apex of the femora, posterior tibiæ except a wide median annulus and their tarsi

except the first and last joints, reddish; anterior and middle tibiæ except wide median annulus and their tarsi except the apical joint, yellowish. All the femora have a fringe of strong black hairs on the apical portion of the posterior side. Claws, except their apical half, reddish. Wings long, everywhere tinged with brownish; veins all brownish. Long. corp., 10 mm; al., 9 mm.

This species is very closely allied to *C. tristis*, Loew, but is easily separable from that species by the colour of the antennæ and the form of the third joint, which is not at all "subrotundo," as well as by several other characters.

One specimen [Marin County, California; Haines], in the collection of Cal. Acad. of Science. It was kindly transmitted to me for examination by Mr. Chas. Fuchs, through the courtesy of Mr. H. H. Baer, of the Academy.

This specimen is the identical one referred to by Mr. C. H. Tyler Townsend, in the Proc. Cal. Acad. Sci., Ser. 2, Vol. IV., 611, under the head of *Chilosia*, n. sp.?

Allograpta fracta, O. S. Western Diptera, 331, 1877.

The type of this species, a single male, was captured by Baron Osten Sacken, at Santa Monica, California, February 20, 1876. Since then no record has been made of its capture. In the collection of the University of Nebraska is a single female specimen captured at Los Angeles, California, November, 1887, by Prof. Bruner. It differs in no respect from Osten Sacken's description of the male. The front is yellow laterally and the first segment of the abdomen has the sides as well as the anterior margin yellow.

It is quite a remarkable fact that of the two specimens of this species known in collections, the latter one was captured in exactly the same locality as the type, though eleven years later.

Mesogramma parvula, Loew.

This species has been recorded from Florida and Georgia only. There is a male specimen in the collection of the University, labelled Orizabo, Mex., Jan., '92; Prof. Bruner. It agrees exactly with the description, except that the black of the second segment of the abdomen is entirely shining and that the third and fourth segments have the black markings very obscure, but like the typical ones in outline. Two other specimens from St. Augustine, Florida, collected by Mr. C. W. Johnson, of Philadelphia.

A careful study of this material seems to make it clear that *M. Boscii*, Macq., and *M. parvula*, Loew, are one and the same species. Absolutely the only differences in the descriptions of these two species are in the markings of the abdomen, and they are notoriously variable in the species of this genus. In *Boscii* the first segment is black and the anterior half of the second is yellow; in *parvula* the anterior margin of the first segment is yellow and the anterior margin of the second is black. Now, one of these specimens shows a very narrow yellow anterior margin on the first segment, and the other specimen has it entirely black, but in both the second segment is black on the anterior margin. Such a combination of the only characters that separate these species in individual specimens seems to make their identity certain.

Mesogramma marginata, Say.

One specimen from Orizabo, Mexico; Jan. This species has been recorded from all parts of the United States and from several points in Mexico.

Baccha Tarchetius, Walker.

There has been recorded only one specimen of this species besides the type in the British Museum; this one was from New Jersey [Mr. Keen] and is now in the National Museum. In the collection of the University are two specimens—one from Philadelphia, Penn., and the other from Mobile, Ala.—both taken by Mr. C. W. Johnson, and from his collection. They are both females and differ from the description of the male in having two yellow spots similar to those on the third segment on the fifth. In all other respects the description applies exactly.

Baccha clavata, Fabr.

This species is a common one in the Southern States. It has been recorded from Georgia, Florida, Arizona, and two localities in New Mexico; Schiner mentions it "aus Süd-America." The capture of a specimen at Lincoln is therefore quite remarkable and gives the species a very much enlarged range. This specimen, a male, was taken near the flowers of a species of aster growing near the water, in September, by the writer. The larva of this species is a very beneficial one in districts where oranges are grown, as it feeds on the aphids that often infest the trees.

Baccha notata, Loew, *Diptera America septentrionalis*, Cent. VII., 65, 1861.

MALE.—"OCHRACEOUS; VERTICAL TRIANGLE AND SPOT ON THE FRONT, BLACK; DORSUM OF THORAX, EXCEPT LATERAL BORDER, DARK OCHRACEOUS, MARKED MEDIALY WITH A GREENISH - BLACK STRIPE; ABDOMEN WITH DARK LINES; WINGS INFUSCATE, TOWARDS COSTA LUTESCENT.

"Head luteous; occiput cinereous; vertical triangle black; front opaque, black pilose, and with a minute black spot; frontal lunule naked, near the antennæ black. Antennæ ochraceous. Face light ochraceous, semi-transparent, entirely shining. Thorax ochraceous; dorsum, except the wide lateral margins, dark fuscous, with two median lines abbreviated posteriorly and double lateral marks shining virescent. Scutellum ochraceous; metanotum bronzy - black; pectus marked with black. Abdomen ochraceous, with fuscous longitudinal lines; hypopygium bronzy-black. Legs ochraceous; apical third of posterior femora and posterior tibiæ, except a wide subbasal annulus, subfuscous. Wings infusate, towards costa yellowish; marginal and apex of the submarginal cells distinctly coloured with fuscous." [Translation.]

One specimen, a male, agrees in almost all respects with Loew's description. The coloration of the wings is much less marked, however. They are subhyaline, iridescent, costa tinged with testaceous. The posterior femora are testaceous except a dark annulus on apical third; the posterior tibiæ except basal third are dark. The abdomen is furnished with moderately long light pile, especially on the first and second segments. First segment, except a broad, uninterrupted band on posterior margin, yellow; second segment fuscous subtranslucent with a distinct light band just beyond the middle; remaining segments yellow, except the lateral margin and four slender black bands slightly expanded at the apex. Third joint of antennæ very short; oval.

One specimen [Charlotte Harbour, Florida; Mrs. Slosson]. This species was described by Loew, in 1861, from a specimen collected by Gundlach, in Cuba. The present is the first record of its capture since that time and the only record of its occurrence in the United States.

My thanks are due to Prof. Williston for aid in determining this specimen.

Eristalis latifrons, Loew.

This is a very widely-distributed and common species in the West.

Snow has recorded it from five different localities in Colorado and from four in New Mexico. Besides this, it has been recorded by Williston, from California, Kansas, Arizona, Texas, and Mexico, and from the latter locality also by E. Giglio-Tos. In the collection of the University there are numerous specimens from Lincoln and West Point, Neb., Custer, S. D., Los Angeles, Cal., and Lerdo, Mexico. The three female specimens from the latter locality are not in the least different from the others.

Several female specimens that are not otherwise different have a very large spot of brownish in the middle of the wing. One female specimen from Lincoln, Neb., lacks the opaque spots on the third segment of the abdomen, as did several male specimens from California that Prof. Williston mentions.

Eristalis Brousi, Will.

There are specimens in the collection of the University from Hot Springs, and Custer, S. D., Soda Springs, Idaho, and Laramie, Wyoming. One female specimen has the spots on the second segment of the abdomen yellow and distinct, as Snow has observed in other specimens. This species has been recorded from Alaska to Colorado and to New England.

Eristalis montanus, Will.

A male specimen collected at Soda Springs, Idaho, by Prof. Bruner, agrees exactly with Williston's description, except that the eyes are distinctly contiguous, and that the black of the third segment of the abdomen is not contiguous with that of the second; the margin of the second segment posteriorly is yellow slightly tinged with reddish. The type specimen of this species, a single male, was captured at Como, Wyoming, at an altitude of 7,000 feet. The present is the only record of its capture since that time. A female specimen taken also at Soda Springs, at an altitude of 5,000 feet, on flowers near the water, in August, shows the following differences from the male, which have never been described: The second segment of the abdomen has the black as wide on the posterior margin as on the anterior; the posterior margin black, third segment mostly shining black, with sides broadly yellow, with an anterior spot and narrow posterior margin opaque; fourth like third, except no opaque spots; fifth entirely shining black. The front is black with yellow pile, and the vertex is black pilose. Otherwise it is exactly like the male.

Eristalis hirtus, Loew.

This is a very widely-distributed and common species all over the West. It has been taken at four different localities in Colorado, as well as New Mexico. The collection here contains numerous specimens taken at Custer, South Dakota.

Eristalis flavipes, Walker.

There are two specimens of this species in the collection of the University. One of them, a male, captured at Lincoln, Nebr., is a typical form; another, a male, captured near Lake Winnipeg, on the Saskatchewan River, in Canada, by Prof. Bruner, in September, is Loew's *E. melanostomus*, or, as it is now considered, *Eristalis flavipes*, var. *melanostomus*, Loew.

It is worthy of note that this species is predaceous, quite anomalously among the *Syrphida*. The latter of the two specimens just mentioned was captured sucking the substance of a small grasshopper, *Chloëalis curtipennis*, which it held in its grasp after the manner of many of the *Asilida*.

Pteroptila cincta, Drury.

Two males and one female from Jamaica, W. I., have the abdomen and scutellum entirely of a strong reddish colour. The hypopygium is large and shining red. Collected at Portland, Jamaica, by C. W. Johnson, of Philadelphia.

Mallota cimbiciformis, Fall.

There is a specimen in the collection of the University taken at Milford, Nebr., in June.

There is another specimen that is very difficult to place. It was taken in War Bonnet Canyon, Sioux County, Nebr. Williston has described a species, *M. Sackeni*, that differs from *cimbiciformis* only in having the eyes separated in the male, and the wings marked with a distinct brown spot. There is perhaps also this difference, viz., that in *Sackeni* the marginal cell is closed in the margin, while in *cimbiciformis* it is distinctly open. Williston states, in litt., in reply to a letter in which I expressed some doubt as to the right of *M. Sackeni* to stand as a species: "The question of the 'art recht' of *M. Sackeni* is doubtful. I found specimens, however, from Mexico agreeing perfectly with the type specimen (a note of which I made in the Biol. Central Amer.), and thus continued the name. It is not at all improbable that the species runs into the older species, and that the name can only be used with a varietal meaning."

The specimen above mentioned has the eyes distinctly separated, and would hence fall into *M. Sackeni*. But the wings are not more distinctly marked than in *M. cimbiciformis*, the marginal cell is distinctly open, and the last segment of the abdomen is covered with long erect yellow pile, while in *Sackeni* the abdomen is entirely black pilose. These points together would seem to make it distinct from that species, although the very strong character of the eyes being separated would make it that. It differs from all the forms of *M. cimbiciformis* in the above-mentioned pilosity of the abdomen, and in the separation of the eyes. I have consulted almost a dozen different descriptions of *M. cimbiciformis*, which it is more than probable represent all of the different variations, and invariably the abdomen is described as entirely black pilose, except the first segment. There is a further difference in the form of the face below. After thus stating the case, and exercising all the care that should be exercised in erecting a new species in a genus where the synonymy is already immensely complex, I feel justified in describing the specimen as new.

Mallota facialis, n. sp.

Male.—Antennæ obscurely reddish, shining except the third joint, arista yellow. Wide facial stripe and cheeks shining. Face white pubescent and pilose, strongly projecting below, so that a line from the tip of the tubercle to the tip of the epistoma would have a distinct outward slant; the epistoma projects distinctly further than the antennæ [the outline of the face is quite different in the other species of this genus]. Eyes bare, very narrowly separated. Pile of thorax and scutellum bright yellow. Thorax black, scutellum translucent. First segment of the abdomen but little shining, whitish pilose; second and third segments shining, and everywhere covered with short, stiff black hairs; fourth shining bronzy, everywhere covered with abundant long, bright yellow pile. Legs black, all the tarsi, and tips of femora strongly and fore and middle tibiæ entirely and basal half of posterior tibiæ weakly reddish. Posterior tibiæ without spur. Wings very slightly marked with brown at the separation of the second and third veins.

One specimen [War Bonnet Canyon, in extreme North-western Nebraska].

Xylota analis, Will.

There are known specimens of this species as follows: In the U. S. National Museum, one male from Cala. [Baron], and two females from

New Mexico [Gauger], which form the types of the species; in the collection of the Kansas University, two males from the Magdalena Mountains, in New Mexico [Snow]; and in the collection of the University of Nebraska, one male, taken in War Bonnet Canyon in the extreme north-western part of Nebraska. This last specimen agrees exactly with Williston's description except that the antennæ are entirely red.

Xylota flavitibia, Bigot.

This species has been recorded from Colorado, by Williston, and from Colorado and New Mexico, by Snow. The collection of the University contains one male specimen taken in War Bonnet Canyon, Nebraska.

Xylota fraudulosa, Loew.

The collection of the University of Nebraska contains numerous specimens taken near Milford, Neb., in June, on the flowers of *Prunus americanus*. It has also been recorded from several localities in the East, and from Illinois, Wisconsin, and Washington, in the West.

Xylota angustiventris, Loew.

This species has been recorded from New York, Penn., and Ill., but not hitherto west of the Mississippi River. A single male specimen from War Bonnet Canyon, in extreme North-western Nebraska, has the wings hyaline, the third segment of the abdomen shining, except a very broad posterior band which projects almost to the anterior margin. The fourth segment is entirely shining.

Xylota obscura, Loew.

There is in the collection of the University of Nebraska, one female specimen taken in War Bonnet Canyon, Nebr. This species has been recorded from Oregon, California, and the Red River of the North. The description applies exactly.

Spilomyia quadrifasciata, Say.

One female specimen taken at Lincoln, Nebr., in September, by the writer. With the exception of the record of several specimens in Eastern Kansas, by Snow, this species has not been recorded outside of some of the extreme Eastern States. This specimen was taken on the flowers of *Aster multiflorus*.

Sphecomyia vittata, Wied.

In the University collection there are two specimens, one from Belmont, Nebr., and the other from War Bonnet, thirty miles distant. This species has been recorded from the Eastern and Southern States, and Minnesota and Colorado, in this country, as well as from localities in Northern Europe and Siberia.

PIERIS RAPÆ AND AGRAULIS VANILLÆ.

BY W. G. WRIGHT, SAN BERNARDINO, CALIFORNIA.

P. Rapæ, the introduced "European cabbage butterfly," on its westward march across this Continent, was first taken in Nebraska on August 3, 1881. (See CAN. ENT., 1882, 39.) In May, 1883, I took one male in Southern California. At that time I did not know its name, but I spread it and placed it in my cabinet as unknown. In a few years an Eastern Entomologist called on me, and at once identified it as P. Rapæ. It was yet other years before I saw another specimen in flight, though collecting diligently every season. About 1890 or '91 other specimens were observed, and thereafter every year brought them in rapidly increasing numbers, till now they are extremely abundant, flying early and late in the day, and early and late in the spring and fall, and at times, as in cold or cloudy weather, when only a very few of the native species can fly, indicating that it is more hardy than the native species, and that it will eventually dominate. As might be expected, the larvæ feed in good part on cabbage plants, but yet they are not at all dainty or particular as to food, and many other plants are used. Last year I raised some fine specimens from eggs laid on leaves of common nasturtiums, in the garden, and wholly fed upon those leaves.

The native Pierids, P. Protodice, P. Beckeri, and P. Sisymbri, do not oviposit on any cultivated plant so far as I know, preferring wild plants, while Rapæ apparently prefers cultivated ones. Evidently Rapæ will in a few years become a great pest. Already they fly in numbers everywhere, but especially about the Chinese vegetable gardens, and the flower gardens and dooryards of the towns.

Another introduced butterfly is that beauty from the Southern States, *Agraulis Vanillæ*. This species came into California over the Southern Pacific Railroad soon after trains ran through from Louisiana, or say in 1885. I well remember the first ones I ever saw. There were two of them in a front dooryard feeding on the flowers, and I was in a buggy driving along the street; but my net was handy, and I instantly went in pursuit of the red beauties, capturing them both as a first move, and explaining to the surprised people of the house afterward. Now *Vanillæ* is everywhere in evidence, and its larvæ are so abundant that large old passion vines are sometimes wholly denuded of leaves by them. *Vanillæ* is also extremely hardy and vigorous, flying, like Rapæ, at unfavourable times and seasons, as if bent on conquest. Still, it has not increased so rapidly during the last few years as has Rapæ.

These two species are the only ones as yet brought into the State from the East.

ON THE POSITION OF THE GENUS DEMAS.

BY HARRISON G. DYAR, PH. D., NEW YORK.

In the March number of the CAN. ENT., pp. 81-82, Mr. Tutt falls back upon the writings of Dr. Chapman to support his position for this genus as among the Liparidæ*. As Mr. Tutt has thus gracefully retired from the discussion without making a direct answer to my facts, I can only, in reply, briefly notice Dr. Chapman's position.

In the egg of Demas, Dr. Chapman, on a matter of detail, seems to imply an absence of relation with the Apatelidæ; but the fact remains that the egg is vertically ribbed as in the Noctuidæ, Apatelidæ, and Thyatiridæ, which I take to be the essential character. The Lymantriidæ, which belong to the Notodontian-Lasiocampid series have smooth, or obscurely reticulated eggs, the vertical lines having no tendency to become prominent.

In the young larva, Dr. Chapman has not discovered the peculiar arrangement of the warts, on which I lay special stress. He would ally Demas to Liparis on "the abundance of hairs and their length, the character of the tubercles, the anterior trapezoidal being more important than the posterior and the colouring." The hairs and colouring may be dismissed at once, as they are notoriously adaptive and variable characters. The statement about the tubercles is surprising. While it is correct of Demas as figured, the reverse is strikingly the case in many Lymantriids. The anterior trapezoidal (tubercle i.) in this group have a marked tendency to disappear, and I can only suppose that Dr. Chapman has made some mistake. His own figure of *Dasychira pudibunda* (pl. ix., fig. 8) shows the anterior trapezoidals clearly the smaller. The structure in Demas really tells in favour of my view.

In the second skin, Dr. Chapman describes a medio-dorsal depression on joints 5 to 11 and 12 "in the position of a peculiar organ in various Liparids." I see no good reason for the inference that these are the homologues of the dorsal eversible glands of the Lymantriidæ. In the first place they seem not to have any indication of the structure of such glands, and in the second place they are not homologous in position. In the Lymantriidæ, the glands occur on the 10th and 11th segments only; when others appear on the anterior abdominal segments, as in *Stilpnotia salicis* and *Lymantria dispar*, they are paired, not single.

*The name Lymantriidæ, as this family "appears to be called by American authors," was adopted by me from Mr. G. F. Hampson's Mouths of India.

Dr. Chapman then remarks that in the further skin the larva has a more Liparid-like general appearance. The "appearance" is to me, however, not Liparid, but Arctian. When I first saw the larva, years ago, I took it for *Halisidota Harrisii*, till I noticed the different arrangement of the hair-pencils.

Next, he states that the habit of living between spun leaves is not that of an Acronycta. It is, however, decidedly so of our *Charadra deridens*, one of the Apatelidæ. But if *Demas* stood alone in this respect it would form no valid argument to remove it from the Apatelidæ, so slight and little specialized is the habit, evidently a recent adaptation.

As concerns the pupa, I do not pretend to be so conversant with the subject as Dr. Chapman is, and therefore his positive statement that "the pupa of *D. coryli* is not that of a Noctua" is entitled to consideration. However, I do not find the statement in "The genus Acronycta and its allies," a little book containing reprints of these articles, kindly sent me by Dr. Chapman, nor do I notice the positive characters which would lead to such a conclusion. Indeed, Dr. Chapman admits that "the character of the anal armature has some resemblance to various Noctua forms." But, indeed, suppose that the pupa be really "not that of a Noctua," the fact could only be applied to this discussion if it were shown that the pupæ of the other Apatelidæ were true Noctua pupæ, since it is equally true that the larva of *Demas* is "not that of a Noctua"; but neither are those of any other Apatelidæ. Now, Dr. Chapman says, speaking of the pupæ of the genus *Apatela*: "The pupa is less characteristic [than the larva]; it serves rather to divide the genus . . . than to define the group as a whole. The pupa of the *rumicis* group is very characteristic and rather bombyciform in its aspect. The others are more of an ordinary Noctua pattern, but present features that separate them from other families. This is a somewhat rash statement to make, since I must confess my knowledge of Noctua pupæ is of a rather superficial character."

These are all the points which I can gather from Dr. Chapman's account, and I do not think that they go far to refute my position, drawn from positive structural characters in the larva. Indeed, I should not feel called upon to criticise Dr. Chapman's interesting and valuable papers, except to examine the grounds of Mr. Tutt's position.

SOME ARGYNNIDS OF PARK CITY, UTAH.

(Elevation, 7,000 feet,)

BY ARTHUR J. SNYDER, EVANSTON, ILL.

Any time before the middle of June, entomological studies in the mountains are apt to be interrupted by snowfalls; but from that time to September, one will seldom find a better or more interesting place for study. The climate is delightful, and though the common opinion is that no rain falls upon the great plateau, here as elsewhere, suppositions are not facts.

My brief experiences (covering portions of two summers) would indicate that Utah receives as much rain during July and August as the State of Illinois. During the latter month, in 1893, there were frequent showers, and at least two heavy rains. In July, 1895, we experienced a very rainy day, and several showers. Nevertheless, at times it becomes so dry on the mountains that one must seek the low, irrigated meadows to find butterflies abundant.

The genus *Argynnis* is well represented in the West and North-west. From low lands to an elevation of 9,000 feet one finds many representatives.

The most striking species, as to colour and size, which I have found there is *A. leto*. This insect must be seen alive to be fully appreciated. Whether seen on the wing, or resting on a thistle blossom, it is a prize well worth the collector's attention. It appears in Utah (Park City) early in July, and its numbers gradually increase, until in August it may be called almost common. As is so frequently the case, the males appear first, and were found in the ratio of ten to one as compared with the females.

Mr. Maynard says *Leto* is found in California, Nevada, Oregon, Washington, and Montana. It has been my good fortune to capture it in Utah, Idaho, and Wyoming. I do not know how far East it has been taken, but my friend, Mr. William S. Bates, took several specimens of a female *Argynnis*, which I am satisfied are *Leto*, in Michigan during the past summer, and I have heard that it has been taken in Minnesota. I have never read that the female of *Leto* is dimorphic, but would not be surprised to learn that it is, or that *Leto* and *Cybele* are, or were at some time not far distant, one and the same species.

It is not difficult to secure eggs of *Leto*, and were it not for the fact that the larvæ hibernate, there would be no difficulty in rearing the

species. I believe Mr. W. H. Edwards has done so. Females confined over fresh violets oviposited readily, and in 1893 a number of larvæ were brought to Illinois, and subjected to "the cold-storage process" for the winter. In the spring, however, they failed to awaken from their lethargic condition.

A. eurynome was very common on low lands near Park City. At least 600 were taken in 1893. In one open meadow covered with flowers there were thousands of this species. Two forms or varieties were found, the ordinary one with silvered spots below, and a variety with all the spots below yellow. The ratio was about one yellow form to twenty-five of the silvered. A remarkable fact was noted. A silvered ♀ and a yellow ♂ were taken in *coitu*; a yellow ♀ and a silvered ♂; a silvered ♀ and a silvered ♂, and also a yellow ♀ and a yellow ♂. I am *positive* of all the statements except the last concerning the yellow ♀ and yellow ♂.

We know that peculiar specimens are sometimes the result of hybridism. Melanism may result from cold, drought, etc., and almost everyone has seen "sports" in the insect world.

I await with interest the results of future study concerning these subjects. It is commonly asserted that hybrids are never fertile. Is this *known* to be true?

A. myrina was abundant in the meadow mentioned above, but I do not remember having seen it elsewhere in Utah.

A. epithore was found on low ground flitting among the leaves of a large canna-like plant. One specimen also was taken beside a small mountain stream.

A. kremhild was taken in the same locality.

A. egleis was taken on a hillside near town, in an open spot, where the sun's rays seemed to linger at eventide, but near the underbrush where it was easy to escape among the scrub oaks and sage bushes. In its habits it much resembles *A. coronis*.

A. coronis was rare at Park City, but more common in the mountains, near Salt Lake City and Ogden.

A. Nevadensis and *A. Meadii* were also rare at Park City, but more abundant near Salt Lake. In habits they were quite unlike *coronis* and *egleis*, always being found on the flowers or else crossing swiftly to some place where flowers were more numerous, never dropping to the ground and flitting below the sage bushes, but seeking escape in swift flight. They also seemed to prefer lower ground,—the valleys instead of the hillsides.

A. montivaga.—One specimen taken.

A. Edwardsii.—Only one specimen taken.

A. liliana.—Only one specimen taken. Mr. W. H. Edwards says that the *A. coronis* and *A. nevadensis* taken in Utah are larger than ordinary. To my mind the *A. coronis* taken in Utah are unlike those taken in Colorado, both as to size and colour, but I have seen very few of the Colorado specimens.

In my collection are a number of *Argynnis* which seem to be unnamed.

For identification of specimens I am indebted to Prof. G. H. French, Dr. Henry Skinner, and Mr. W. H. Edwards.

My studies of this group lead me to believe that it sadly needs revision; that when it is studied carefully by someone who has facilities for comparing all the species and varieties described, many so-called species will prove to be synonymous; that when all the species have been bred and the stages studied, some surprising truths will be unearthed.

With a collection containing thirty-five species (?) and several varieties (?), I am willing, for the present at least, to say "don't know" to many things concerning the genus. I am anxious to find out something and contribute my mite towards unravelling the remarkable tangle.

LUNA EGGS—A CORRECTION.

Mr. Dyar kindly points out that the eggs mentioned by me on page 79 of the March number are not those of *Actias Luna*, as stated, but are those of *Telea Polyphemus*. He adds that "Luna eggs are quite different, being almost entirely black, and laid in little clusters on the twig, not on the leaf." Not having bred these moths from the egg, I had to rely on such descriptions as were at hand. Rogers [CAN. ENT., VII., 199] describes the eggs of Luna as "dark brown or chocolate colour, flattened at the sides, smooth, and about .05 of an inch in length; the sides were of a lighter shade." Saunders [Sixth Ann. Report, 41] says of *Polyphemus*: "The egg is about one-tenth of an inch in diameter, convex above and below, with the convex portions whitish and the nearly cylindrical sides brown." Minot [CAN. ENT., II., 27] also describes Luna eggs as very dark sepia, although some were almost entirely white. My eggs appeared to me to answer better to the description of those of Luna, and as the difference in method of attachment to food-plant was not given, I came to the conclusion that they were those of Luna, as the moth is usually abundant in the grove of hickories where the eggs were obtained.

W. HAGUE HARRINGTON.

A CANADIAN TRIGONALYS.

BY W. H. HARRINGTON, F. R. S. C., OTTAWA.

Trigonalys Canadensis, n. sp.

Male.—Length, 10.5 mm. Black with yellowish markings. Head transverse, as wide as thorax, about twice as wide as long when viewed from above; face above the antennæ, and vertex, polished, impunctate, without apparent sutures and with sparse blackish pubescence; the cheeks and under surface with pubescence more dense; clypeus polished; palpi slender; antennæ as long as head and thorax, rather stout, eighteen-jointed, segments subequal; eyes small but prominent; ocelli small, in a triangle on a line with the posterior margins of the eyes. Thorax rugose with coarse, irregular punctures, those of the pleura and pectus smaller and more numerous; posterior angles of prothorax yellow; legs rather slender, coxa and femora black, remainder yellow, the tips of tibiæ and tarsi somewhat dusky; wings subhyaline, with dark stain covering marginal cell and extending slightly beyond each end of it, stigma and costal nervures black, remaining nervures reddish, second and third submarginal cells subequal; scutellum abruptly rounded posteriorly, post-scutellum yellow, prominent, subpyramidal, notched at apex, in suture on each side several deep shining foveæ; metathorax very short and rounded at sides, without prominent angles, a small yellow spot on each side. Abdomen polished, impunctate, apparently with six segments; second segment as long as all the following and with a yellow central band, or elongated spot on each side; a yellowish spot at lateral base of segments 3 and 4, very faint on the latter; venter slightly pubescent, with double row of yellow spots on segments 1 to 5, largest on 2nd.

This is the first record of the occurrence of any member of the family Trigonalidæ in Canada, and I am indebted for the privilege of describing the specimen to Mr. Fletcher, who received it in Sept., 1893, from Mr. Wilkinson, of Victoria, B. C. It was taken from the cell of a wasp (probably *Vespa occidentalis*) which had built on his verandah, and he had observed that the wasps were rapidly decreasing in numbers, apparently from the presence of this parasite, and of a smaller species of hymenopteron, of which, unfortunately, no specimens appear to have been preserved.

ITHYCERUS NOVEBORACENSIS, FORST.

In former years I had found this beetle, the largest and most conspicuous weevil of our fauna, to occur only upon beeches, as noted in my sketch of the Rhyncophora, in Eleventh Annual Report. Such, also, was Mr. Chittenden's record [Ent. Am., Vol. VI., 168]. Its infestation of the twigs of oak had been recorded by Riley, who described the larva. Its occurrence upon hickory is noted by Mr. Beutenmuller [CAN. ENT., XXII., 201], and it is known as injurious to apple and other fruit trees. On June 9th, 1895, I observed a pair in *coitu* upon the trunk of a hickory (*Carya amara*), where there were no beech trees near by, and on carefully examining other hickories in the immediate vicinity I found five more pairs. Two or three days later I examined the same trees and could not detect a single beetle, nor did I find any on subsequent examinations. This shows that missing the exact date for such an insect might lead to its escaping observation entirely, as those trees had been examined in former years.

W. HAGUE HARRINGTON.

A CORRECTION.

For the new genus of Megalopygidæ, *Brachycodion*, described in the last volume of CAN. ENT., read *Aidos*, Hübner. The genus is not in Kirby's Catalogue, and I thus came to overlook it. The following is the synonymy:—

Genus *AIDOS*, Hübner.

1818. Hübner, Verz. bek. Schmett., p. 191, No. 1962, *Brachycodion*, Dyar.

1895. Dyar, CAN. ENT., XXVII., 244.

Type *A. amanda*, Stoll.

I must apologize for this synonym by hastening to correct it.

HARRISON G. DYAR.

Through the kind consideration of Mr. A. R. Grote, the Society has been put in possession of his paper on the Apatelidæ, noticed by Dr. H. G. Dyar, in CAN. ENT., Vol. XXVIII., p. 86; also, the original photographs of the plates, beautifully executed, and greatly admired by all who see them. The form and ornamentation are displayed with remarkable life-like distinctness, even to the tubercles and rounded bodies of the larvæ, which are somewhat lost on the plates, but well defined in the photos, testifying to the great advance that has been made in this method of illustrating entomology since Mr. Grote first adopted it twenty years ago.

J. ALSTON MOFFAT.

NOTES ON NEW MEXICO AND ARIZONA HYMENOPTERA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, NEW MEXICO.

With the exception of some undetermined gallflies and parasites, the following list of 86 species contains all the Hymenoptera collected (and bred) by the author, in the South-west, of which it has proved possible to get the names, except four mentioned in CAN. ENT., 1892, p. 200. The gallflies and parasites above referred to will be recorded in some papers to be published in the future. The cottonwood, *Blennocampa*, mentioned in CAN. ENT., 1893, p. 304, and in Zoe, iii., pp. 234-236, should also be included in the above exception.

As the list is not large, the species are arranged alphabetically. The fact that I have not been able to refer to Cresson's catalogue explains this, as it does the absence in most cases of the authorities for the species.

In the four cases where the query and asterisk occur, two species got mixed under one number in sending for identification to *Ent. News*, so that it is uncertain to which the locality and notes belong.

Agapostemon melliventris, Cr.—La Vega de San José, Valencia Co., N. Mex., August 4. One. A small, elongate species, with head and thorax entirely vivid Paris-green colour. Abdomen, legs, and antennæ yellow, the hind borders of segments brown. Det., Fox.

Allantus uncinatus, Nort.—Hart Little Spring, Arizona, July 14. Seven specimens. Det., Fox.

Andrena, sp.—Las Cruces, N. Mex. One ♂. A moderately small, elongate, entirely black species. Wings slightly fuscous. Det., Fox.

Andrena, sp.—Las Cruces, N. Mex. One ♂. Clypeus white. A small, elongate species. Black; thorax and head whitish pubescent. Wings slightly smoky. Det., Fox.

Anthidium, sp.—Las Cruces, N. Mex., May 17. One ♂. A moderately small species with clear wings. Thorax with yellow border, except in front, and two delicate yellow vittæ. Abdomen black, with yellow hind border to each segment. Det., Fox.

Anthidium, sp. near *mormonum*.—Las Cruces, N. Mex. One. A small form, with wings clear. Abdomen black, with irregular yellow hind borders to segments, interrupted in middle on six segments. Det., Fox.

Anthidium interruptum, Say.—Chaves, N. Mex., August 6. Three. Las Cruces, N. Mex. One. Det., Fox.

Anthophora, sp.—Hart Little Spring, Arizona, July 14. One specimen. A grayish pilose bee, larger than *Megachile relativa* ♀, and with the abdominal bands of pile gray. Det., Fox.

Anthophora, sp., probably n. sp.—Chaves, Valencia County (near Los Lunas), N. Mex., August 6. One ♂. A species of moderate size, fulvous pilose, including first abdominal segment, rest of abdomen black with white or yellow hind borders to segments. Wings clear. Det., Fox.

Anthophora, n. sp.—La Vega de San José, N. Mex., August 4. One ♂. Wholly yellowish, whitish pilose, with clear wings. A rather large species. Det., Fox. (?) *

Anthophora maculifrons?—Las Cruces, N. Mex. One ♂. Small species, grayish cinereous pilose all over, only front border of abdominal segments 1 to 3 showing black. Pile on abdomen very short. Wings clear. Det., Fox.

Anthophora montana, Cr.—La Vega de S. José, N. Mex., August 4. Two specimens. Det., Fox.

Anthophora occidentalis, Cr., ♂.—La Vega de S. José, N. Mex., Aug. 4. One ♂. Wholly yellowish, whitish pilose, with clear wings. A rather large species. Det., Fox. (?) *

Anthophora Walshii, Cr., ♂.—La Vega de San José, N. Mex., Aug. 4. One. Clypeus white. Six abdominal segments with white hind margins. Det., Fox.

Braconid.—Grand Canyon, Arizona; Hance trail, July 11th. One specimen. A bright red species, with wings fuscous or black. Det., Fox.

Calliopsis, sp.—Las Cruces, N. Mex. Two. Det., Fox.

Cecoris (sic *Cerceris*?) *venator*, Cr.—Chaves (near Los Lunas), N. Mex., August 6. One. Very like *Eucerceris*, sp., but basal abdominal segment smaller and black. Det., Riley.

Centris, sp. ♀ (♀ of *lanosa*?).—Las Cruces, N. Mex. One. Det., Fox.

Cerceris bicornuta, Say.—La Vega de San José, N. Mex., August 4. Two. Det., Riley.

Chalybion caruleum, L.—La Vega de San José, N. Mex., August 4. One. A small bluish-black wasp, a common species in the Eastern U.S. Det., Riley.

Chelonus sericeus, Say.—Continental Divide, Tenaja, N. Mex., Aug. 2. One. A blackish saw-fly (?). Det., Riley.

Chlorion occultus.—La Vega de San José, N. Mex., Aug. 4. One specimen. El Rito, N. Mex., Aug. 5. One specimen. Det., Fox.

Crabro, sp.—Hart Little Spring, Arizona, July 14. One. A black, shining hornet, with abdomen banded with yellow, but no yellow on scutellum. Det., Fox.

Crabro, sp., near *Packardi*.—Hart Little Spring, Arizona, July 14. One. A black hornet, of narrowed form. Abdomen banded with yellow, legs yellow. Det., Fox.

Crabro delectus, Cr., ♂.—Continental Divide, Tenaja, N. Mex., Aug. 2. One. A small black and deep yellow hornet. It was infested with two dozen small rufous mites on dorsum of base of abdomen. Det., Riley.

Crabro minimus, Pk.—Las Cruces, N. Mex. Name com. by Prof. Cockerell. Det., Fox.

Cryptus, sp. aff. *americanus*.—Hart Little Spring, Arizona, July 14. One specimen. A good-sized black ichneumonid with red abdomen. Det., Fox. (?) *

Cryptus callipterus, Say, ♂ ♀.—Las Cruces, N. Mex. An ichneumonid. Two females and two males. One of the males is considerably smaller and more slender, and generally darker. Det., Riley.

Cryptus proximus, Cr.—Hart Little Spring, Arizona, July 4 and 14. Two specimens. Det., Fox.

[TO BE CONTINUED.]

BOOK NOTICES.

“Handbuch der paläarktischen Gross-Schmetterlinge für Forcher und Sammler,” by Dr. M. Standfuss, Jena, 1896 (Verlag von Gustav Fisher).

This is a second edition of the “Handbuch für Sammler der europäischen Gross-Schmetterlinge” rearranged and enlarged by the addition of certain studies in the theory of descent; 392 pages, and eight coloured lithographic plates.

The author gives an extensive account of the methods of collecting, of breeding larvæ, pairing of imagoes, both of the same and of different species, etc., interspersed with interesting philosophical remarks. As the preface says, “this book unites in itself two objects: lepidopterological practice and scientific-zoological speculation.” The special case of hybridization recounted in detail, on pages 66 to 107, represents a very neat piece of work. The author shows, by considerations of the

egg, larva, pupa, and imago, that the three Saturnias, *spini*, *pavonia* and *pyri*, differ in degree of specialization; that they are phylogenetically of different ages, *spini* being the oldest, or least specialized, and *pyri* the youngest form. The hybrid larvæ between the first two and last two are figured adjacent to the normal forms, and the greater resemblance of the hybrid to the more generalized form in each case is striking, thus neatly confirming the conclusions already reached, and all on the lines laid down by Weismann.

Our author also gives an account of experiments on the effects of different temperatures on hibernating larvæ and pupæ, with figures of some of the forms of imago produced. There is an account of variation, seasonal dimorphism, local forms, etc., discussed from the most recent scientific standpoint. The book contains much of interest which it is unfortunate that we are not able to enjoy more easily in an English edition.

HARRISON G. DYAR.

BRITISH MOTHS, by J. W. Tutt. London: George Routledge & Sons. Pp. 365.

The young collector in the British Isles will no doubt welcome this manual, which will not only help him to name any specimen that he may collect, but give him also much information regarding the habits of the moth in its preparatory as well as perfect stages. It is written in the author's well-known pleasant and readable style, and is not merely a dry handbook. There are twelve coloured plates and over sixty wood-cuts, illustrating the majority of the families. There are also a number of tables, giving the times of year when the species may be looked for in the egg, larval, pupal, and perfect states; the food-plant of the larva; the location of the pupa; and notes on the variety or abundance of the moth. It would have added much, we think, to the handiness of the book if it had contained comparative tables of genera and species as well.

RANDOM RECOLLECTIONS OF WOODLAND, FEN, AND HILL, by J. W. Tutt., F. E. S. London: George Gill & Sons. Pp. 256. [2s. 6d.]

We are glad to see that a second edition of this delightful little book on outdoor natural history has been called for. In this new issue the matter has been, to some extent, rearranged and revised, and its attractiveness has been much enhanced by a pretty cover and over a hundred excellent illustrations. Though it deals with "Old Country" scenes, and the insects, birds, and plants that frequent them, it can be read with great interest by any lover of nature in any part of the world.

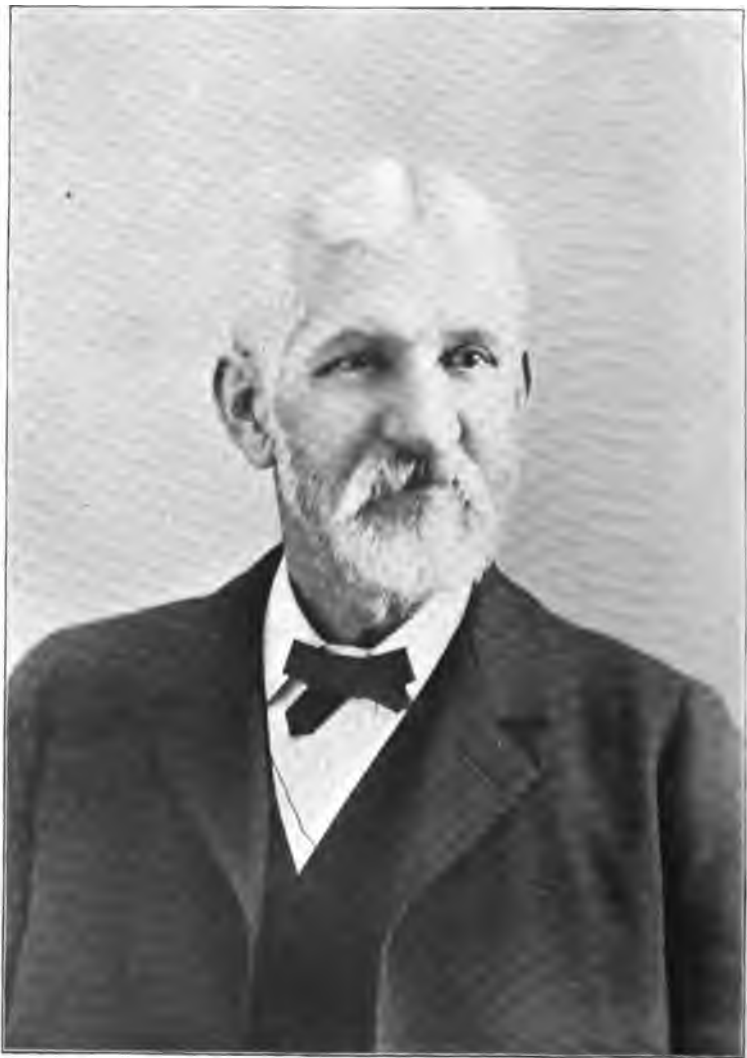
REPORT OF OBSERVATIONS OF INJURIOUS INSECTS AND COMMON FARM
PESTS DURING THE YEAR 1895, WITH METHODS OF PREVENTION
AND REMEDY. Nineteenth Report, by Eleanor A. Ormerod, F.
R. Met. Soc., etc.

This splendid report fully sustains the high standard of excellence which has characterized Miss Ormerod's previous publications. The preface shows that the unusual and prolonged low temperature of the winter of 1894-95 had apparently but little affected the insects which it might be supposed to destroy.

The following pests are treated of in separate chapters: Apple, *Smerinthus ocellatus*; bean, *Bruchus rufimanus* and *B. fabæ*; cabbage, *Ceutorhynchus sulcicollis*; corn and grass, *Charæas graminis*, *Cetonia aurata*, *Phyllopertha horticola*, *Melolontha vulgaris*, *Rhizotrogus solstitialis*, *Tipula maculosa* and *Oscinis frit*; gooseberry, *Bryobia pratiosa*, *B. ribis* and *Nematus ribesii*; mangolds, *Aphis rumicis*, *Silpha opaca* and *Atomaria linearis*; orchard caterpillars, *Cheimatobia brumata*; pine, *Astynomus adilis* and *Retinia buoliana*; plum, *Scolytus rugulosus*; strawberry, *Harpalus ruficornis*, *Pterostichus madidus* and *P. vulgaris*; turnip, *Helophorus rugosus*.

The ravages of the bean weevil appear to have been serious, and those of the ground beetles, upon strawberry, have been more extensive than in previous years. Ninety-three pages are occupied with the discussion of the above mentioned insects, while fifty are allotted to "Flies injurious to horses, cattle," etc. These chapters are exceedingly interesting, and several species of Hippoboscidæ, Tabanidæ, and Cæstridæ, which are very annoying and injurious to domestic animals, are fully and clearly discussed. In connection with the account of the attacks of the Forest Fly, *Hippobosca equina*, are given two magnificent plates showing upper and side views of the foot of this fly, the tarsi of which are so modified as to enable it to secure a most firm grip on the hairs of the animal upon which it alights. The report concludes with a chapter on Deer and Dog Ticks, very troublesome mites belonging to the Ixodidæ. W. H. H.

Mailed April 1st.



JOHN M. DENTON.



The Canadian Entomologist.

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No. 5.

JOHN M. DENTON.

It is with profound regret that we record the death of our old friend and highly-esteemed colleague, Mr. John M. Denton, of London, Ontario, who was one of the early members of the Entomological Society and always took a very lively interest in its welfare. For some months he had been in poor health, owing to an affection of the liver, but was able to attend his place of business from time to time, and to take part in the proceedings of our annual meeting in November last, when many of us saw him for the last time. In January his illness assumed a more acute form and confined him to the house. On Tuesday, March 24th, he was seized with paralysis and before midnight passed peacefully away.

Mr. Denton was born in Northampton, England, on the 19th of September, 1829. His father was a farmer by occupation, and he was consequently brought up in the country amidst rural scenes and learnt there to love and observe the beauties of nature. At the age of fourteen he was apprenticed to a woollen draper and tailor, and spent seven years in thoroughly learning the trade and becoming proficient in all its details. For a few years he was engaged in business on his own account, and in 1855 married Miss Ann Walker, of Somersetshire, England, who survives him. He then emigrated to Canada and settled in London, and at once resumed his occupation as a tailor, having but little to begin upon except a hopeful heart and a thoroughly practical English training. By patient industry, unflinching courtesy, and unswerving integrity, he built up by degrees a most successful business as a merchant tailor, and won the respect and esteem of the whole community.

Living on a farm in his boyhood and apprenticed at so early an age, he had but little opportunity of acquiring a literary education, but by constant application and careful reading he overcame these disadvantages

and attained a more than ordinary knowledge of the subjects that interested him. Foremost among these was Entomology, which he studied especially in its economic aspects as affecting live stock, fruit trees, garden and field crops. He became an authority on these topics, and was frequently called upon to address meetings of farmers and fruit growers and give them the benefit of his knowledge and experience. His love of the farm continued throughout his life, and he devoted much of the time that he could spare from business to the cultivation of a fruit farm a few miles from London. He was no mean authority upon horses and cattle and had a considerable knowledge of their diseases and most satisfactory treatment. He was also an adept with the microscope and took great delight in searching into the hidden beauties of nature.

When the London branch of the Entomological Society was formed in July, 1864, he was one of the original members, and took a most active interest in it and the parent Society to the close of his life. He was elected Vice-President of the London branch in 1872, and President in 1878 and several years following. In 1871 he became a member of the Council of the parent Society and continued to hold office for five and twenty years; in 1892 he was elected Vice-President, but he would never allow himself to be nominated for the Presidency, though urged to do so more than once. He was also an active member of the Ontario Fruit Growers' Association and gave much assistance to its work.

He was a man of deep religious feelings and of earnest but unobtrusive piety. Though a leader of the Plymouth Brethren, he never intruded his views upon those who differed from him. The writer knew him well for a great number of years, and during his visits to London often enjoyed his hospitality, but never did he hear a word fall from his lips that could wound in the slightest degree the susceptibilities of those who did not accept the theological opinions that were so dear to him. He was a good, honest, sterling man whom all respected and whom his friends loved; kind, charitable, and generous; courteous in manner, most hospitable in his home, above reproach in business; a man who is a distinct loss to the city in which he lived, and whose death creates a blank in the hearts of his friends which can never in this life be filled. To his childless, sorrowing widow we tender our deepest, sincerest sympathy.

CAPTAIN J. GAMBLE GEDDES.

It is our painful duty to record the loss of another active member of the Entomological Society of Ontario. At two o'clock on Good Friday morning, April the 3rd, Captain J. Gamble Geddes died after a few days' illness, brought on by a severe cold. He was born in Montreal in 1850, and educated there. When a young man he entered the service of the Molsons Bank and was for some time attached to the office in London. He at once joined the Society and became an enthusiastic member. In 1874 he was elected Secretary-Treasurer of the London branch; in 1875, Vice-President; in 1876, President. He left London on his appointment as manager of the agency of Molsons Bank at Millbrook. Here, living in the country, he devoted most of his leisure time to the collection and study of insects, applying himself especially to the Lepidoptera. In 1880 he left the Bank and was appointed Aide-de-Camp and Private Secretary to the Hon. John Beverley Robinson, during his term of office as Lieutenant-Governor of Ontario. Being fond of society, of handsome presence and devoted to music, he became a great favourite among the social circles of Toronto, among whom much of his time was accordingly spent. He did not, however, abandon the pursuit of Entomology, but succeeded, by correspondence and exchange, in addition to the captures of his own net, in forming a large and valuable collection of butterflies from all parts of the world. This he sold to the Dominion Government, and it now forms the nucleus of the collection in the Geological Museum at Ottawa. He made expeditions in 1883 and 1884, to Manitoba and the Northwest Territories, as far as the Rocky Mountains, in quest of butterflies, and added much to the knowledge of their geographical distribution and habits. On several occasions he visited England, and spent some time in Germany and also in Bermuda. Wherever he went he made the acquaintance of the leading Entomologists and added to his stock of knowledge.

His first contribution to this magazine was in 1874, when he wrote No. 14 of a series of articles on "Some Common Insects"—"The

Common Cockchafer," C. E., Vol. VI., p. 67. His subsequent papers were the following :—

"List of Diurnal Lepidoptera collected in the Northwest Territories and the Rocky Mountains in 1883," C. E., XV., 221; XVI., 56, 224; XVII., 120; one hundred and twenty-six species were enumerated.

"Euptoieta Claudia," C. E., XVII., 60 (1885).

"Notes on Three Small Collections of Diurnal Lepidoptera, made in 1886" [These were made in Newfoundland, the Kamanistiquia River, Lake Superior, and Hudson Straits], C. E., XVIII., 204.

"Some Notes on the Genera *Colias* and *Argynnis* whilst alive in the Imago State," C. E., XIX., 166 and 230 (1887).

"Notes for Collectors visiting the Prairies and Rocky Mountains," C. E., XXI., 57 (1889).

"*Colias Chione*," C. E., XXI., 59.

He also contributed the following articles to the Annual Reports of the Society :—

"Some Remarkable Captures in Ontario," 18th Report, 1877, page 21.

"On Some of the Collections in England and the German Empire," 22nd Report, 1891, p. 31.

"Insects Collected in Bermuda during the Winter of 1894," 25th Report, 1894, p. 25.

In addition to his love for Entomology, he took a great interest in Philatelics, and formed a large and valuable collection of postage stamps. He was an accomplished musician, and usually sang in the choir of the church that he attended; he was also a member of the Philharmonic Society of Toronto. He belonged to the Masonic Order, in politics was a strong Conservative, and in religion a member of the Church of England. His wife, who was a daughter of the late Edward C. Jones, of Toronto, died a little more than a year ago. The untimely death of Capt. Geddes was no doubt hastened by her loss. They have left two little orphan girls, aged three and five years respectively.

The writer, who knew him intimately from his boyhood, deeply deplores his loss, and his grief is shared in by a very large circle of relatives and friends.

TWO NEW SPECIES OF PAPIRIUS.

BY JUSTUS WATSON FOLSOM, CAMBRIDGE, MASS.

Papirius vittatus, n. sp.

Younger specimens dark purple above with pearly markings, lavender or lilac beneath; older ones maroon to almost black above, sides mottled with several shades of purple and brown. Head free, purple, with a broad, white transverse band across the front; oral region whitish; vertex with a distinct, white, sagittate mark from antennæ to prothorax; a black ocellus-like speck on the middle of the vertex; a few short bristles upon vertex and front; eyes dark, close behind antennæ upon a black patch narrowly surrounded by purple. Antennæ longer than the body, except in largest individuals, segments variable in relative length, but approximately in the ratio of 1:6:7:1.5 or 1:7:9:2; basal segments stout, as long as broad, brownish, with short, white bristles; second brownish at base, purple at middle, pearly apically, hairy distally; third purple, hairy, with obscure, whorled subsegments on apical half, broadening towards apex, penultimate subsegment swollen on one side; terminal segment purple, lanceolate in outline with five to seven distinct, whorled subsegments. Body ovate dorsally with a re-entering angle. Dorsum dark purple to blackish, with a pattern in pearly white, essentially as follows: On anterior half of dorsum a median longitudinal purple streak between two pearly streaks with dentate margins; behind these a squarish purple spot bounded by pearly and bisected by a short, median longitudinal, pearly streak; on either side, two short, irregular, pearly lobes extending obliquely forwards; next behind on the median line are one to three roundish purple spots broadly surrounded by pearly white; on posterior of abdomen a long, oblique pearly bar directed forwards from either side of the median line. Largest abdominal segment with a small, pale tubercle on either side of the middle. Dorsum naked anteriorly, with short white bristles posteriorly. Anal tubercle with bristles four times as long, and with a median longitudinal purple bar. Sides purple to blackish, with conspicuous hazel, chestnut and cinnamon mottlings. Thorax with a broad, lateral, longitudinal pearly band, sometimes replaced by one to four bright white spots. Sides of abdomen with two to five large, conspicuous, pure white spots, widely separated. Ventral surface lilac or lavender. Ventral filaments extensible to the length of the antennæ. Legs long, purple and yellow; tibia with broad alternate bands of dark violet and wax-yellow, white bristly. Claws

white; superior claw long, tapering, rather straight, six toothed; inner edge with two prominent teeth at about equal intervals; two more on both sides near the outer edge, dividing it into thirds; inferior claw half as long as the other, straight, tapering, bearing subapically a slender bristle longer than the claw, also a tooth upon a swelling on the inner edge near the base. Furcula almost reaching the head; manubrium stout, purple; dentes twice as long, slender, pale lilac, each with long white bristles on either side, and a single, extra long ventral, subapical bristle; mucrones white, less than one-third the dentes, narrowly elliptical, ventral concavity shallow, with distinctly serrate edges, apex clearly emarginate, having a median, rounded, quadrate notch between two rounded teeth.

Maximum length, 3.3 mm. Described from over fifty specimens.

This species was found abundantly in February and March of this year, in a greenhouse at Cambridge, Mass., upon wet, decaying wood, and upon the outside of alga-coated flowerpots, especially in warm, moist and shaded situations.

P. vittatus is closely allied to *P. marmoratus*, Pack. I have examined the types of the latter species which have shrivelled and lost colour, yet show distinct, structural differences from *P. vittatus*, especially in the claws and mucrones. *P. marmoratus* has a longer, oblong mucro, not emarginate, but terminating in a distinct, rounded lobe; the distal spines of the dentes are clearly barbellate; claws shorter and stouter; the superior claw has four teeth much more obscure than the six of *vittatus*: an evident tooth on the middle of the inside, a second, obscure, midway towards the apex, and a pair of small lateral teeth near the outer edge, one-third from the apex; the inferior claw has a short, apical bristle, and is less dilated basally than in *P. vittatus*.

This species is easily recognized by the broad white head band, the sagittate mark, the three median dorsal streaks, and the brilliant white spots on the sides of the abdomen.

Papirius opalinus, n. sp.

General colour orange-rufous or ferruginous. Head, first two antennal segments, anal tubercle, and legs pale orange-ochraceous. Head with a few short bristles on front; vertex almost naked, swollen dorsally; eye spots black, often quadrate. Antennæ shorter than the body, from three-quarters to one-half as long, according to age; basal

segment twice as long as broad, naked; second three or four times as long, knotty, hairy towards apex; third purple, four or five times the basal, knotted, hairy except basally, obliquely dilated but squarely articulated at apex; terminal segment purple, half again the basal, lanceolate, moderately long, white, hairy. Body regular, elongate-oval in dorsal outline; anterior dorsum naked, translucent orange-ochraceous with a broad and long median shading of green due to chlorophyll in the stomach (lateral, convulsive movements of which are easily observable in living specimens); posterior dorsum and sides orange-rufous to dark ferruginous, often with a tinge of maroon, the general colour being due to the combined effect of minute orange-ochraceous and ferruginous mottlings; posterior dorsum with short white bristles upon minute, round, orange-ochraceous spots; anal tubercle hardly visible from above, bristly. Ventral surface pale yellow, with three pairs of smooth, buff-yellow tubercles: a small, rounded tubercle on either side the manubrium; a large, oval, oblique one either side the middle; a narrow, oblique pair anterior to these; ventral tube pale orange-ochraceous, transparent, buff-yellow inside at base; tube plus protruded filaments one-fourth longer than the antennæ. Legs slender; femur with sparse, short bristles; tibia paler distally, stout spiny at moderate intervals; claws white, very stout; superior claw of almost uniform width, little curved towards the mucronate apex, six toothed: inner edge with a tooth at the middle, and another midway between it and the apex; two pairs of lateral teeth, similarly placed near the outer edge; inferior claw two-thirds as long as the other, long triangular, tipped with a short bristle from a stout, straight midrib; inner edge sinuate or straight, with a short bristle one-third from base. Furcula short, reaching to ventral tube; manubrium extending beyond anal tubercle, sparsely hairy; dentes twice as long, stout, pale orange-rufous, with short, lateral bristles, and several longer, ventral bristles at regular intervals; mucrones white, one-fourth dentes in length, oblong, finely serrate beneath, apex rounded.

Maximum length, 1.6 mm. Described from over fifty specimens.

This species occurred abundantly with *P. vittatus* at the same time and place, feeding upon algæ on the outside of flowerpots, and, curiously, having the exact colour of the latter.

Types of the above species have been given to the Museum of Comparative Zoology at Cambridge, Mass.

LEPYRUS.

BY JOHN HAMILTON, M. D., ALLEGHENY, PENN.

The species of *Lepyrus* in North America have not heretofore been well understood. The genus has recently been treated monographically by an American writer, several forms being described for the first time : one of these has since been discovered to be identical with the European *capucinus*, Schall, and *geminatus*, Say, to be *palustris*, Scop. To make these species better known is the object of the present paper, and the following synonymy and bibliography are presented :—

LEPYRUS PALUSTRIS, Scop., 1763, Entomol. Carniol, 33; *colon*, Linn., 1771, Mant., p. 531; Kirby, Faun. Boreal, IV., 197; Leconte, Mon. Rhyn., p. 127; *geminatus*, Say, Lec. ed., I., 273; *geminatus*, Casey, Ann. N. Y. Acad. Sci., VIII., 825.

In the work referred to, *colon* = PALUSTRIS, which to that time had been considered common to the two hemispheres, was suppressed, and the American form united with *geminatus*, the reasons being an alleged more elongate form, much larger and more transverse prothorax carinate along the middle, a carinate beak, and much sparser vestiture. The reasons assigned conclusively prove that the writer was not well acquainted with the European form as a whole, nor even with the American. Such differences do exist, but they are merely individual and apply equally well to the extremes of the individuals of either continent. Here it may be remarked that the European examples usually seen in collections rarely fairly represent the species, being mostly the largest and more conspicuous, which are the most uniform and least characteristic : that most frequently seen here being the form with a long cylindrical sub- or non-carinate beak. That the individuals of this species are very variable in Europe is evident from the number of named varieties in the catalogue, and that the same holds good here may be seen in any collection containing examples from all parts of the Continent where it inhabits. Before me are fifty examples from several localities in Europe (Italy, Austria, Switzerland, France, Portugal), exhibiting great diversity in form, size, sculpture and vestiture, but finding counterparts in the American forms before me from Massachusetts, New York, Canada, Michigan, Indiana, Wisconsin, Missouri, Kansas, Colorado (Greely, Garland), Nebraska, Manitoba (Winnipeg). The only constant characters I have yet discovered among these diversified forms are in the mesosternum, which is flat between the coxæ, a little narrower and more triangular in the male than in the female; and in the tibial situation of the

femora, with a small mucro internally (sometimes not very evident). Where these characters are found, however diverse the forms, specific unity is indicated.

Before drawing comparisons, it will give better results to note the differences among the foreign forms, and for contrast, that approximating most closely the American as described by Kirby is selected for description.

Alate, surface black, clothed with gray, hair-like scales, an oblique stripe on each side of the thorax, a spot on the fourth interval of the elytra in front of middle, and a row of spots on each side of the abdomen of longer, denser white scales; the femora also annulate with white; the abdominal spots are more frequently yellow, and often the stripes on the thorax. Head densely squamulose, finely and closely punctate, a linear fovea between the eyes; antennæ with the first joint of the funicle short and thick, second longer and attenuate to base, scape attaining the eye or not, according to the length of the rostrum; beak a little longer than the thorax, cylindriciform, a little dilated in front of the insertion of the antennæ, densely squamulose, finely and closely punctate, carina fine, attaining the frontal fovea or not. Thorax coniform, narrowed, more or less sinuously, from base to apex, where it is slightly constricted and about two-thirds as wide as at base, one-fourth wider than long; disk irregular, often flattened and uneven, densely punctato-rugose, varying from fine to coarse; sides coarsely tuberculo-rugose, median carina ending in the basal depression sometimes abbreviated, sometimes obsolescent. Elytra three-fourths wider than thorax, about one-half longer than wide, apices mostly separately acuminate and porrect, sometimes conjointly rounded with a slight notch, serial punctures variable in size and closeness, intervals mostly even, sometimes the third, fifth and seventh wider and elevated. Femora mostly armed with a small spine; mesosternum flat, more or less triangular.

The following individual variations may be noted :—

Rostrum.—Varies from about as long as the thorax to one-fifth longer, sometimes strongly cylindrical in the longer beaked, in which the carina is weak and frequently apical; more quadrate in the shorter beaked, with the carina stronger, often attaining the fovea.

Antennæ.—In examples with short rostrum the scape reaches the eye, but not in those with it elongated.

Thorax.—One-fourth to one-fifth wider than long, sides often a little dilated at apical third; other variations are mentioned in the description.

Elytra.—The serial punctures may be large and irregularly spaced or smaller and closer; examples of the same length vary in the median width of the elytra one-sixth of the width or more; the humeral angles are usually rounded to thorax, but not infrequently full and obtusely angulate. Other variations are noted in the description.

Vestiture.—In the form described it is long, hair-like, and moderately evenly distributed over the surface; in other forms it is so short as to but imperfectly conceal the surface; in others both lengths occur; the colour varies from uniformly cinereous to uniformly yellowish-brown, the

intermediates being variously tessellated or spotted with white, brown, yellow, and gray scales irregularly intermixed; the thoracic stripes, the elytral and abdominal spots, and the spots frequently seen on the apical protuberances vary from white to yellow.

Femora.—The internal angle of the situation for the tibia is nearly always armed with a minute spine in all the femora, but to be seen in some examples requires close observation, and seems occasionally to be obsolete.

Contrasted with the European *palustris* as a whole the American completely harmonizes, while at the same time it is just as variable and might likewise be separated into varieties; there might be a var. *Kirbyanus*, a var. *geminatus*, etc.

The rostrum, while mostly shorter, with the scape attaining the eye, is occasionally as long as in any of the European examples; it is usually stouter, more quadrate and with a stronger carina, but these differences are not constant. The thorax in general offers few points, the most noticeable being that the median carina is usually stronger and seldom absent. The elytra while variable individually in regard to the serial punctures, form and punctuation of the elytral intervals, do not differ in these respects from what is seen in the European. The form vestiture and coloration are in no way different. The mesosternum and femoral armature are identical. These two characters with the forms of the first two joints of the funicle are very constant in every variety of both countries and the only ones yet discovered which can claim absolute specific value.

This species varies in length from .26 to .45 inch. I have taken it in Canada on the willow, and it is said to occur likewise on the aspen (*Populus*). It seems to be the species most commonly met with; besides the places heretofore mentioned, it is reported from Louisiana and Illinois.

The question has been asked: With what species did Dr. Leconte compare *geminatus*, since *colon* has the tips of the elytra acuminate [Mon. Rync.]? I can only say that it may have been an example of *colon* with the tips conjointly rounded, which sometimes occurs; or it may have been *capucinus*, in which they are habitually rounded and which is labelled *colon* in some collections. Say's *geminatus* had a white spot on the elytra, Dr. Leconte's a yellow one. In some collections all examples with the spot white are labelled *colon*; all with it yellow

geminatus; in collections containing *capucinus*, which is not very common, that species is labelled *colon*; and all others *geminatus*, without regard to the colour of the elytral spot, and again that is labelled *geminatus* and all others *colon*.

L. CAPUCINUS, Schall., *alternans*, Casey.—Length, .36–.45 inch. Habitat—Michigan, New Hampshire, Maine.

Black, apterous, form robust, vestiture variable. Rostrum stout, longer than the thorax, sulcate on each side of the carina which attains the frontal fovea or not, closely, unevenly, partly confluent punctured; scape of the antennæ attaining the eye or not, the first and second joints subequal in some examples, the second much longer in others, probably sexual differences. Thorax transverse, wider than long, sides parallel to apical third, then rapidly rounding to apical constriction, apex one-fourth narrower than base; sub-convex, surface even, a slight depression in front of scutellum, closely covered with granuloid tuberculations small on the disk, larger and rugous on the sides; median carina fine, mostly attaining the base. Elytra oval, in general one-half longer than wide, two-thirds to three-fourths wider than thorax; striate, striæ obscured by the vestiture, but when denuded, deep and narrow, with a row of punctures in the bottom; intervals either regular and evenly spaced or irregular with the first and third wider, the others perceptibly narrower and slightly furrowed along the middle; the granuloid tubercles vary from excessively fine to moderately coarse; apices conjointly rounded. The anterior femora in the male have the tibial sinuation rectangularly laminate on the upper side, and usually the middle and posterior; mesosternum elevated between the coxæ. The vestiture is variable, but mostly of gray and whitish elongate scales evenly intermixed, sparse, not concealing the black surface, the usual median spot on the elytra absent, but a white one on each apical protuberance, the abdominal spots wanting or only traceable in a few denser white hairs. In an example from New Hampshire the vestiture is mottled and denser, the abdominal and median elytral spots present.

In the European examples seen (all males) there are no abdominal nor median elytral spots, and the vestiture is that first described. The fuller description of the present species, with more ample material than that of Mr. Casey, has reduced the alleged differences between this and *Canadensis*, Casey, to this: Striæ not distinctly punctured, *Canadensis*; striæ distinctly punctured, *capucinus* (*alternans*). This seems to be too small a difference, all other things being equal, on which to base a species, especially in a genus where the individual characters are so instable.

LEPYRUS PERFORATUS, Casey.—While this species in form is similar to *palustris*, and with the same form of ornamentation, yet it is structurally different; the femoral sinuation is gradually rounded, not spinose as in *palustris*, nor angulate as in *capucinus*; the mesosternum is sub-elevated, not flat as in the former, nor so prominent as in the latter. The general vestiture is very short and sparse, not concealing the tubercular rugosities and variously tessellate with minute, denser, pale scales; the elytra and under side are covered with distant, small, polished black

tuberculoid granules, much larger on the thorax ; the intervals are slightly alternately narrower, sometimes on the same plane, sometimes the narrower deeply depressed, producing a costate appearance ; the serial punctures are large and unevenly spaced ; the apices are conjointly rounded with a slight notch. This species is fully as large as *gemellus*. The examples seen are from Vancouver Island and the high mountains of British Columbia.

Mr. Casey has described some forms which have not been seen.

L. OREGONUS, the describer states, differs from *palustris* (*geminatus*) in the more elongate form, much smaller and less transverse prothorax, longer and almost non-carinate beak, coarser serial punctures, and more prominent sutural angles of the elytra. Habitat—Oregon.

L. PINGUIS, Casey, is said to differ from *geminatus* by its more obese form, stouter beak and coarser punctuation, more exposed humeri, more declivous elytra and denser vestiture. Habitat—Colorado (Rocky Mountains).

L. ERRANS, Casey, is described from a unique taken in the mountains of New Mexico, near Abiquire, in which the elytral intervals are separated rather by striæ than by series of punctures, alternately narrower and depressed, the narrower more finely sculptured and clothed with denser brown squamules ; the elytra tessellated with patches of denser pale scales, and the usual median spot not distinguishable. The beak is longer than the thorax, with a broad and feeble carina.

L. CANADENSIS, Casey.—As stated under *capucinus*, this species should probably go into synonymy, but the form has not been seen and there may be some really specific structure not mentioned by the describer. The length is given at .44 inch, and the habitat, Canada (North-west).

L. GEMELLUS, Kirby.—This species is only mentioned to complete the genus ; it is not nearly related to any of the others ; more elongate, elytra longer with four or five broad elevated interspaces separated by striæ-like impressions, each interspace with a depressed linear furrow, roughly scalerous, lines of denser white scales on the intervals simulating vittæ ; thoracic stripes and abdominal spots white, median elytral spot absent ; mesosternum as in *perforatus*, the femoral sinuosity a little more abrupt. Length .40-.50 inch. Habitat—Vancouver Island to Hudson Bay.

Though the genus has but recently been treated monographically, after disposing of *geminatus* and *alternans*, it was thought it might be useful to state briefly the characters assigned to the other species, as in all probability the large majority of the readers of the CANADIAN ENTOMOLOGIST will never see the memoir alluded to.

The genus *Lepyrus* affords grand opportunities for the creation of species to entomologists who form them on the same basis as those of rocks and minerals.

THE MALE OF MONODONTOMERUS MONTIVAGUS, ASHM.

♂.—About $4\frac{1}{2}$ mm. long, moderately dull brassy-green (about the colour of some species of *Dolichopus*, which it superficially resembles); third abdominal segment above blackish; tips of femora, and whole of tibiae and tarsi, reddish-ochreous. Wings hyaline, veins dark brown. Antennae black, scape greenish. Head rather finely punctate, rather broad, eyes prominent, vertex somewhat flattened. Antennae rather short, scape very peculiar, irregularly reniform, the distal swelling largest; flagellum uniformly cylindrical, except the tip, which is transversely flattened. Thorax narrow, strongly punctate. Parapsidal grooves deep and complete. Scutellum with a transverse furrow, and its posterior margin occupied by a ridge which is foveolate above. Tegulae green. Stigma bifurcated; post-marginal vein nearly twice as long as stigmal. Posterior femora beneath very finely denticulated, with one large tooth about the beginning of its distal fifth. Abdomen narrow, shining; first segment smooth on dorsum, remaining segments finely transversely striate. Second segment extremely narrow on dorsum.

Hab.—On leaf of *Populus*, sp., campus of N. M. Agricultural College, Las Cruces, N. M., May 8, 1895. (Ckll. 2945.)

This species was described from a ♀ taken by the writer at West Cliff, Colorado. The ♂, now first described, seems to differ considerably, and I should never have referred it to the same species, but for the fact that Mr. Ashmead assures me that the identity is certain. According to Howard's synopsis of the genera of Chalcididae, it would not go into *Monodontomerus*, which has the posterior femora smooth beneath, except for the large tooth. The insect is a parasite of wild bees.

T. D. A. COCKERELL.

THE CIGAR CASE-BEARER OF THE APPLE (*COLEOPHORA FLETCHERELLA*).

BY JAMES FLETCHER, OTTAWA.

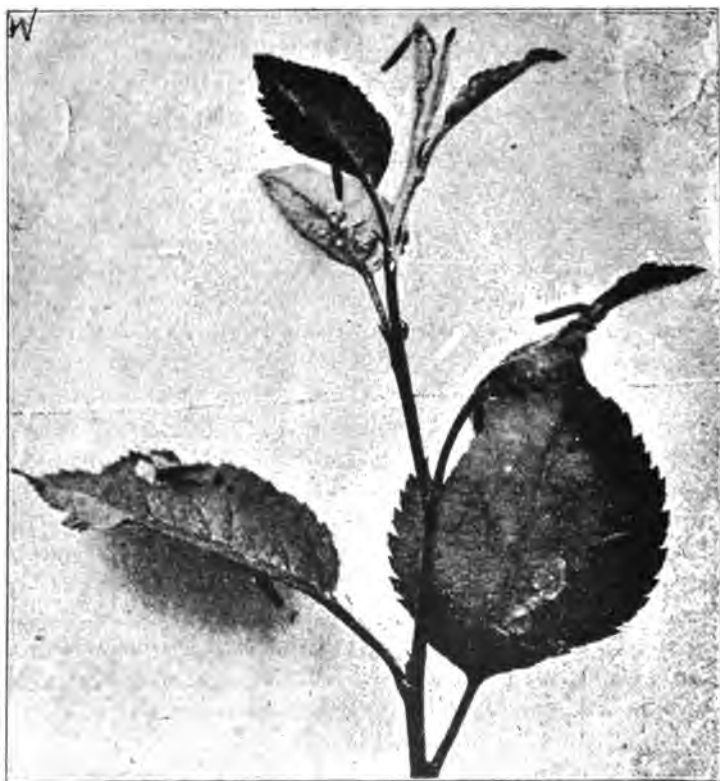


FIG. 12—CIGAR CASE-BEARERS AT WORK—NATURAL SIZE.

(Figure copied from Cornell Bulletin, No. 93, by M. V. Slingerland.)

In 1889 I received from the late William Brown, of Charlottetown, P. E. I., some larvæ of a small case-bearer, which he had found in large numbers upon his plum trees, and which also occurred in his pear and apple orchards. Since that time this insect has made itself well-known by its injuries in apple orchards in various localities in the Maritime Provinces, and in the Provinces of Quebec and Ontario. A beautifully

illustrated and carefully prepared bulletin has been issued by Mr. M. V. Slingerland, of Cornell University Agricultural Experiment Station, in which the life history of this most interesting but very serious enemy of the fruit grower is fully described. The above illustration, kindly lent by the editor of the Canadian Horticulturist, is copied from that bulletin.

The localities in Canada where this little pest has been most injurious are situated along the northern shore of Lake Ontario and the St. Lawrence. Dr. Young, of Adolphustown, in whose orchard of Duchess of Oldenburgh and Russet apples the first important occurrence of this insect as an apple pest was observed, states that they were first noticed in his orchard about 1885. Reports of its ravages have also been received from Oshawa, Port Hope, and Maitland, Ont., in all of which places it had an appreciable effect on the yield of the orchards.

The life history may be summarized as follows: The eggs, which are described by Mr. Slingerland as beautiful objects, are of a delicate light lemon-yellow colour, deeply pitted with triangular depressions separated by narrow ridges. They are very minute, and are deposited by the females among the hairs of the new shoots and on the under sides of the youngest leaves. The egg stage lasts about two weeks, the little caterpillars emerging in the latter half of July. For the first period of their lives they are miners feeding on the inner tissues of the leaves. After two or three weeks they make small, rather flat and elongated, curved cases, in which they pass the winter. These cases, inside which they live and which they carry about with them, are made of pieces of the upper and lower skins of the mined part of the leaf, lined inside with silk. The two surfaces of the leaf are easily recognizable on the cases from the pubescence of that side which was taken from the lower surface. Soon after making these winter cases, the caterpillars, now about a quarter grown, migrate to the twigs of the tree and fasten themselves securely to the bark. In badly infested orchards they are sometimes found clustered in hundreds around the fruit spurs.

As soon as growth begins the following year, about the beginning of May, the case-bearers crawl out to the opening buds, and at this time

their injuries are considerable, as they attack not only the young leaves, but also the flower buds. The winter curved cases are retained for a short time in spring, and are enlarged by the addition of small pieces of the skin of the leaves attached to the orifice, but after two or three weeks are discarded and another kind of case is made of the same material. This summer case, from which this insect takes its name, is shaped exactly like a miniature cigar. It is brown and very tough; the upper end is contracted abruptly into a three-limbed, star-shaped orifice, the lips of which fit closely together. Through this hole the excrement of the caterpillar is ejected, and ultimately the pretty little steel-gray moth will make its exit. The full-grown caterpillars, which are orange coloured, with black heads and dark feet, four millimetres in length, change to dark brown chrysalids inside the cases about the end of June, and the moths appear about three weeks later.

REMEDIES: The Cigar Case-bearer, when numerous, is a serious pest of the apple tree, and occasionally also of the pear and plum. The most injury results from the young caterpillars early in spring attacking the unexpanded buds, and later the flower stems, the forming fruit, and the foliage.

The results of experiments show that this insect can be controlled by spraying with Paris green and kerosene emulsion; but very thorough and persistent work is necessary. The best results have followed spraying the infested trees very early in the spring with kerosene emulsion, and repeating the operation once or twice at short intervals, four or five days later. The first application may be made with the standard Riley-Hubbard emulsion reduced with only five parts of water. After the leaves expand, the emulsion should be diluted with nine parts of water. Good results have also been obtained by spraying with Paris green (Paris green, 1 lb., quicklime, 1 lb., in 200 gallons of water). Now that the operation for spraying fruit trees with different compounds for the destruction of injurious insects and fungi is getting to be generally adopted by the best fruit growers throughout Canada, the only change necessary in the advised methods will be to spray rather oftener where this insect is known to occur.

NEW AMERICAN PARASITIC CYNIPIDÆ (ALLOTRIINÆ).

BY CARL F. BAKER, FORT COLLINS, COLO.

All of the species described below were taken in Colorado. For most of the specimens I am indebted to the industry of my wife, who has done a large amount of work with the sweep net in Northern Colorado. No American species have yet been described as belonging to any of the genera mentioned, though some of the species described under *Allotria* may possibly be referable to some one of them. A number of species of *Allotria* in my collection are left until such time as the already described forms are more fully elucidated.

Phaenoglyphis, Forster.

This genus is separated from *Allotria* by the parapsidal furrows and scutellar fovea.

Phaenoglyphis americana, n. sp.

Male.—Shining black, legs and antennæ honey-yellow. Length, 1 mm. Antennæ 14-jointed, approximate at base, sockets twice as far from eyes as from each other, reaching beyond the middle of the abdomen; joint 2 as long as 1, 3 twice as long and distinctly bent inwardly, 4 and 5 somewhat shorter than 2; apical joint long, conical, and blackish at tip. Oral region castaneous. Face, prothorax above, mesonotum at sides, scutellum, metathorax and base of abdomen with fine white hair, longest on the scutellum. Parapsidal furrows distinct, not approximate behind, gently diverging anteriorly and extending the entire length of mesonotum. Scutellum with a large semicircular fovea at base. Metanotum opaque and with two longitudinal carinæ, which are equidistant from each other and the lateral margins. Tegulæ piceous. Wings as long as whole body; median vein obsolete; radial cell closed, two and a-half times long as wide; appendix below long, slender, straight, and slightly knobbed at end; radius extending somewhat beyond juncture with marginal vein. Cubital and discoidal veins faintly outlined. Fort Collins; May.

Dylita, Forster.

Under this genus I describe several species in which the radial cell is open for a greater or less distance on the anterior border, and in which the radius is narrowly rounded at tip and does not reach the margin of the wing. Some of the species resemble quite closely various species of *Alloxysta*, but in that genus the radius spreads out irregularly at tip, and there is no appreciable space between it and the margin of the wing.

The following characters are common to all the species described below: Antennæ reaching to between middle and tip of abdomen. Pubescence very sparse, except on metathorax and base of abdomen, where it is short and thick, and on scutellum, where it is long and thin. Prothorax below, a triangular sclerite below tegulæ, and metathorax, opaque and minutely roughened. Tegulæ piceous. Wings as long or slightly longer than the whole body; median vein obsolete.

Dylita bicolor, n. sp.

Female.—Shining black, legs honey-yellow, antennæ piceous beyond joint 4. Length, 1.25 mm.

Antennæ 13-jointed, sockets at middle of face and as far from eyes as each other; flagellum becoming distinctly wider and heavier toward the tip; antennal joint 2 three-fourths the length of 1, 3 equalling 1 in length, 4 and 5 subequal in length to 2; apical joint becoming wider for about two-thirds its length, then rapidly narrowing to a point; four basal joints same colour as legs. Oral region rufous, palpi honey-yellow. Radial cell long, triangular, two and a half times as long as wide, terminal abscissa of radius broadly rounded, appendix below short, strongly bent, knobbed at tip. Fort Collins; June.

Dylita ruficeps, n. sp.

Female.—Shining black, head and antennæ beyond joint 4, dark rufous; legs honey-yellow. Length, 1.25 mm.

Antennæ 13-jointed, sockets above middle of face, nearer to each other than to the eyes; flagellum but little wider toward the tip; joint 3 somewhat longer than 1, 2 three-fourths the length of 3, 4 and 5 subequalling 2 in length; apical joint evenly narrowed to a point and much longer than anteaical. Mandibles honey-yellow, piceous at tips and bidentate. Palpi sordid white. Radial cell triangular, two and one-third times as long as wide, terminal abscissa of radius strongly irregularly bent, appendix below long, angularly bent at extremity. Fort Collins; June.

Differs from *bicolor* in size, colour of head, antennæ, and venation.

Dylita affinis, n. sp.

Female.—Length, 1.25 mm. Closely related to *D. ruficeps*, from which it differs as follows: Head of same width, but shorter, of a very pale bright rufous, with the space between the ocelli dark. Joint 4 of antennæ nearly as long as 3, and slightly longer than 2; sockets above middle of

face, distance between them equalling distance to eyes. Appendix below radial cell long and straight. Fort Collins ; September.

Easily separated from *ruficeps* by the above characters.

Dylita coloradensis, n. sp.

Male.—Black ; head, prothorax, and all pleuræ, pale rufous ; antennæ and legs honey-yellow. Length, 1.5 mm.

Antennæ 14-jointed, sockets above middle of face, as near eyes as each other ; flagellum not enlarging toward the tip ; joint 2 three-fourths of 1, 1-3-4 and 5 subequal ; apical joint conical and not longer than anteapical. Metanotum with two distinct carinæ which converge slightly anteriorly. Radial cell triangular, little more than twice as long as thick, terminal abscissa of the radius somewhat curved, appendix below long, straight, gradually enlarged toward the extremity. Fort Collins ; June.

Readily distinguished from the above species by coloration.

Dylita similis, n. sp.

Male.—Length, 1.5 mm. Very similar to *D. coloradensis*, from which it differs as follows : Space between ocelli dark. Antennæ becoming piceous beyond joint 4. Radial cell longer and more pointed, two and one-half times as long as wide, terminal abscissa of the radius nearly straight, appendix below curved. Fort Collins ; September.

Alloxysta, Forster.

In this genus (or subgenus) the radius reaches the anterior margin of the wing, but the radial cell is open anteriorly. The following characters are common to all the species described below : Antennæ reaching to between middle and tip of abdomen, sockets at middle of face, as near eyes as each other. Pubescence very sparse, except on metathorax and base of abdomen, where it is short and thick, and on scutellum, where it is long and thin. Prothorax below, a triangular sclerite below tegulæ, and metathorax, opaque and minutely roughened. Tegulæ piceous. Wings as long or slightly longer than the whole body ; median vein obsolete.

Alloxysta robusta, n. sp.

Female.—Shining black, antennæ at base and legs honey-yellow. Length, 1 mm.

Antennæ 13-jointed, piceous beyond joint 4 ; flagellum strongly enlarging toward tip ; joints 1, 2 and 3 subequal in length, 4 and 5 somewhat shorter than 3 ; apical joint conical, longer than anteapical. Oral

region rufous, palpi honey-yellow. Abdomen short but very deep, the depth half again the length. Radial cell large; long triangular, length two and a half times the width, terminal abscissa of the radius gently curved, appendix below bent. Fort Collins; June.

Alloxysta longiventris, n. sp.

Female.—Shining black, antennæ at base and legs honey-yellow; head with vertex piceous, all below pale rufous. Length, 1 mm.

Antennæ 13-jointed, dark rufous beyond joint 4; flagellum strongly enlarged toward tip; proportions of antennal joints as in *robusta*. Metanotum with two longitudinal carinæ which converge slightly anteriorly. Abdomen nearly as long as the thorax, slender, upper and lower lines subparallel. Radial cell small, short triangular, length two and a third times the width, terminal abscissa of the radius strongly curved, appendix below straight. Fort Collins; May.

In the form of the abdomen this species differs widely from any other Allotriid I have seen. The abdomen of *A. robusta* differs from the normal form in exactly the opposite direction.

Alloxysta magna, n. sp.

Female.—Large, robust; shining black; antennæ at base and legs honey-yellow; head rufous, slightly darker above. Length, 1.6 mm.

Antennæ 13-jointed, piceous beyond the fourth joint; flagellum subfiliform, scarcely enlarging toward the tip; joints 1, 3 and 4 subequal, 2 about three-fourths as long, apical joint conical at tip, longer than the antepical. Metanotum with two longitudinal carinæ which converge slightly anteriorly. Abdomen globular, as deep as long, and scarcely pointed behind. Radial cell large, triangular, length two and a half times the width, terminal abscissa of the radius strongly curved, appendix below short and straight. Fort Collins; June.

The largest species I have seen, and with the abdomen more nearly globose.

Alloxysta gracilis, n. sp.

Female.—Shining black, antennæ at base and legs honey-yellow; head pale rufous. Length, 1.25 mm.

Antennæ 13-jointed, piceous beyond joint 4; flagellum subfiliform; joint 3 equals one in length, 2 three-fourths as long, 4 and 5 somewhat shorter. Abdomen from the side subtriangular, strongly pointed behind. Radial cell of medium size, two and a half times as long as wide, terminal

abscissa slightly curved, appendix below heavy and straight. Fort Collins ; September.

Differs from *magna* in size, shape of abdomen, etc.

Alloxysta apicalis, n. sp.

Female.—Shining black, antennæ at base and legs honey-yellow, head pale rufous ; abdomen light reddish-brown, black at tip. Length, 1.4 mm.

Antennæ 13-jointed, piceous beyond joint 4 ; flagellum slightly heavier toward the tip ; joints 1, 3 and 4 subequal, 2 a little shorter ; apical joint conical at the tip, longer than the anteapical. Abdomen from the side subtriangular, pointed behind. Radial cell large, two and a half times as long as wide, terminal abscissa slightly curved, appendix below slender, strongly knobbed at the tip. Fort Collins ; September.

Readily recognized by the peculiarly coloured abdomen.

Alloxysta rufipleura, n. sp.

Male.—Shining black, antennæ at base and legs honey-yellow ; head, prothorax, and all pleura bright rufous. Length, 1.25 mm.

Antennæ 14-jointed, dusky beyond joint 5 ; flagellum subfiliform ; joints 1, 3 and 4 subequal, 2 a little shorter, 3 somewhat swollen at the apex beneath ; apical joint conical, little longer than anteapical. Abdomen from side subequilaterally triangular, strongly produced and pointed below. Radial cell of medium size, two and one-half times as long as wide, terminal abscissa of the radius strongly curved, appendix below rather long and emarginate on the proximal side. Fort Collins ; June.

Separated from all the above species by the partially rufous thorax.

Alloxysta abdominalis, n. sp.

Female.—Dark shining piceous, abdomen and thorax lighter ; head and metathorax rufous ; antennæ at base and legs honey-yellow. Length, 1 mm.

Antennæ 13-jointed, piceous beyond joint 4 ; flagellum slightly enlarged toward the tip ; joints 3 and 4 shorter than 1 and but little longer than 2 ; apical joint slender, conical, very long, a half longer than the anteapical. Abdomen from the side subequilaterally triangular. Radial cell shorter and broader than in *rufipleura*, the terminal abscissa of radius gently curved, appendix below slender, curved, knobbed at tip. Fort Collins ; June.

Resembling *rufipleura*, but differing in size, and antennal and wing characters. It is hardly possible that this could be the female of *rufipleura*.

NOTES ON BEES OF THE GENUS *PROSOPIS*, WITH
DESCRIPTIONS OF NEW SPECIES.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

Prosopis affinis, Sm.

Twenty-four male and female specimens sent to Mr. Cresson in 1887 were identified as this species. Since that time I have regarded it as a variable species, and in my last paper (Trans. Am. Ent. Soc., XXII., 116) indicated it as a synonym of *P. modesta*, Say. I now think there are two species, closely allied, but characterized as follows:—

Prosopis affinis, Sm., ♀.—Black, head and thorax opaque, closely punctured; abdomen almost impunctate, first segment smooth and shining, lateral apical margin with a patch of whitish pubescence; flagellum testaceous beneath; subtriangular mark on each side of face, two spots on collar, tubercles, spot on tegulæ, edge of wing base beyond tegulæ, and base of all the tibiæ, lemon-yellow; enclosure of metathorax strongly rugose at base; wings hyaline. Length, 5–6 mm.

♂.—Resembles the female; first segment of abdomen less shining, more punctate, apical margins of segments subtestaceous and subfasciate; face below antennæ, ascending broadly on each side nearly to summit of scape and notched around insertion of antennæ, labrum, mandibles, except rufous tips, concave exterior edge of scape, two spots on collar, spot on tegulæ, edge of wing base, tubercles, tarsi, and tibiæ, except a spot behind anterior and middle pairs and ring on posterior pair, lemon-yellow. Length, 5–6 mm.

Illinois; 16 ♂, 11 ♀ specimens.

Four males differ only in having no yellow on scape; one of these also without a spot on tegulæ.

I think there is no question but that this is the *P. affinis* of Smith, but the male described by him probably does not belong to it. If, however, this should prove to be distinct from *P. affinis*, the name of *Prosopis ziziæ* is proposed for it.

Prosopis modesta, Say, ♀.—Closely resembles the female of *P. affinis*; wing a little more dusky, the extreme base without yellow, tegulæ rarely with a small spot in front. Length, 4–6 mm.

♂.—Scape stout, not strongly concave exteriorly, as in preceding; first segment of abdomen less punctate, more smooth and shining; face below antennæ, narrowing to a point on each side at eye margin; two

spots on collar, tubercles, anterior tibiae in front, middle and posterior pairs at base, and the tarsi, yellow; the tarsi paler. Length, 5-6 mm.

Illinois; 24 ♂, 27 ♀ specimens.

Thirteen male specimens agree with the description; six have a yellow line on mandibles; five have a yellow spot on labrum; three have no spots on collar; two have spots on tegulae, and one has the scape yellow exteriorly. Twenty-two female specimens have the tegulae immaculate; five have small spots on tegulae in front, two individuals of these showing the spot only on one side. This is the commonest species in my neighbourhood. I have taken the sexes in copula. This is the *P. affinis* of Cresson (Proc. Bost. Nat. Hist., xii., 270).

Smith mentions a spot on tegulae in *P. affinis*, while Say does not mention it in *P. modesta*. It is quite probably that Say's description was based on specimens taken in Indiana. This is the only species taken here which agrees with his description. What Say described as the male belongs to *P. pygmaea*, Cr. The female of *P. pygmaea* usually has a spot on tegulae, but not on collar.

Prosopis pygmaea, Cress.

Of twenty-seven female specimens taken here (Carlinville, Illinois), all except nine show a spot on clypeus, two showing three spots; only one shows no spot on the tegulae; all have spots on tubercles and side of face, and no spots on collar. The females without spots on face and tubercles are referred to next. (See Trans., XXII., 116.) Of twenty-three males, fourteen have no spots on tegulae, while two show no spots on tubercles and are without the yellow club-shaped extension of the facial markings.

Prosopis saniculae, n. sp., ♂. — Black, opaque, the abdomen more shining; head and thorax closely and rather finely punctured; abdomen almost impunctate; enclosure of metathorax more rugose than in *P. pygmaea*; form slender; scape very broad, club-shaped; flagellum beneath and apical margins of abdominal segments somewhat testaceous; a subquadrate spot on clypeus, a smaller spot above, a narrow line on each side of face, anterior tibiae in front, middle and hind pairs at base, and the tarsi, yellow; face on each side near insertion of antennae with a rounded depression which is smooth and shining; wings hyaline, nervures and stigma dull testaceous. Length, 4-5 mm.

♀.—A narrow line on each side of face, sometimes wanting, and the tibiæ at base, yellowish. Length, 4-5 mm.

Illinois; four ♂, three ♀ specimens.

Prosopis Illinoisensis, n. sp., ♂.—Black, head and thorax opaque, densely, rather strongly and coarsely punctured; abdomen shining, especially the first segment, which is impunctate, the remaining segments finely punctured; metathorax rather strongly rugose; scape stout; face below antennæ, widening above on each side and somewhat notched about their bases, small spot on labrum, and sometimes on mandibles, two spots on collar, tubercles, anterior and middle tibiæ in front, hind tibiæ entirely, and the tarsi, yellow; wings dusky toward tips. Length, 6 mm.

Illinois; three ♂ specimens.

NOTES ON NEW MEXICO AND ARIZONA HYMENOPTERA.

BY C. H. TYLER TOWNSEND, LAS CRUCES, N. MEX.

(Continued from page 112.)

Diodontus occidentalis, Fox.—Las Cruces, N. Mex. Name com. by Prof. Cockerell. Det., Fox.

Diadasia enavata, Cress.—Las Cruces, N. Mex., August 19. Two. Clypeus black. Det., Fox.

Elis (Dielis) plumipes, Drury.—Las Cruces, N. Mex., August 19. Two. Det., Riley.

Epeolus, sp.—Chaves, N. Mex., August 6. One. A moderately large hornet-shaped species, most beautifully velvety all over, entirely black below, including legs. Thorax black, with circular border light velvety yellow extending on pleura. Abdomen black with light velvety yellow cross-band on segments 1 to 4, those on segments 1 and 2 on hind portion near hind border and projected laterally forward, on first segment the lateral yellow also projected inward on anterior edge. Wings smoky. There seems to be very short pubescence on the thorax, but that on the abdomen is extra short, or is, as it appears, pollen. Det., Fox.

Epeolus occidentalis, Cress.—Turkey Tanks, Arizona, July 18. One specimen. A small hornet-shaped species, with thorax black and yellow vittate, abdomen black and yellow banded, wings slightly smoky, and legs fulvous. Det., Fox.

Eucerceris, sp.—Grant, Valencia County, N. Mex., August 3. One. A yellow and black chrysidid-like hornet. Det., Riley.

Evania, sp., ♂.—Las Cruces, N. Mex., September 9. One. A small blackish and rufous gall-fly (?), with immense thorax and very small pedunculate abdomen. Det., Riley.

Gorytes dentatus, Fox., n. sp.—Grand Canyon, Arizona; Hance trail, July 11. One specimen. A small rufous and yellow hornet. Wings hyaline, anterior pair brownish near tip. Det., Fox.

Halictus ligatus, Say.—Hart Little Spring, Arizona, July 14. One specimen. A small blackish bee. Det., Fox.

Hedychrum violaceum, Brullé.—Chaves (near Los Lunas), N. Mex., August 6. One. El Rito, N. Mex., August 5. One. Det., Fox.

Ichneumon comes, Cress.—San Francisco Mt., Arizona, July 15. One specimen. A black ichneumonid with two yellow bands on abdomen at base, and fulvous-yellow legs. Det., Fox.

Megachile, sp.—Chaves (near Los Lunas), N. Mex., August 6. One specimen. A moderately large species, mostly black; nearest to following species, but with more elongate abdomen, and slightly stouter. Det., Fox.

Megachile, sp.—Las Cruces, N. Mex. One. Clypeus black. ♀. Chaves, N. Mex., August 6. One. Det., Fox.

Megachile relativa, Cress., ♀.—Hart Little Spring, Arizona, July 14. One specimen. A grayish pilose bee, pile of abdomen fulvous and in bands, rest of abdomen showing shining black. Det., Fox.

Megacilissa gloriosa, Fox.—El Rito, N. Mex., August 5. One specimen. Large species, fulvous-yellow pilose, including first abdominal segment, rest of abdomen black with white pilose narrow hind borders to segments 2 to 4. Wings clear. This was a new species, recently described by Mr. Fox.

Megacilissa Yarrowi, Cr.—Las Cruces, N. Mex., August 21. One. A large yellowish-fulvous pilose bee, with dorsum black except last abdominal segment. Front wings black, except bases. Det., Fox.

Melecta interrupta, Cress.—La Vega de San José, N. Mex., Aug. 4. One. Continental Divide, Tenaja, N. Mex., August 2. One. Det., Fox.

Mellisodes, n. sp.—El Rito, N. Mex., August 5. One ♀. Much like *M. obliqua*, Say, ♀, but larger and more yellowish-fulvous pilose on abdomen and especially on thorax. Wings clear. Det., Fox.

Mellisodes menuacha, Cress., ♀.—Las Cruces, N. Mex. One ♀. Det., Fox.

Mellisodes montana, Cress., ♀.—Las Cruces, N. Mex., August 19. One. A species of moderate size, fulvous pilose, including basal abdomi-

nal segment, rest of abdomen black with pale yellowish pubescent bands on segments. Wings clear. Det., Fox.

Mellisodes obliqua, Say, ♀.—Las Cruces, N. Mex. One. Clypeus black. Det., Fox.

Nomia, n. sp.—La Vega de San José, Valencia County, N. Mex., August 4. One. Det., Fox.

Nototrachys texanus, Cress., ♀.—Continental Divide, Tenaja, N. Mex., August 2. One. A small, dark rufous ichneumonid. Det., Riley.

Odynerus, sp.—Las Cruces, N. Mex. A specimen caught in the act of extracting one of the mesquite tineid bag worms from its case [for description of this tineid see *Zoe*, IV., pp. 226–228]. A small black and yellow hornet. Det., Riley.

Odynerus, sp., near *annulatus*, Say.—Grand Canyon, Arizona. Hance trail, July 11. Two specimens. Det., Fox.

Osmia, n. sp.—Las Cruces, N. Mex. One ♀. A small species, with dark green abdomen. Thorax black, dark fulvous pilose above. Wings slightly smoky. Det., Fox.

Pelopaeus Servillei, St. Farg.—El Rito, N. Mex., August 5. One. Turkey Tanks, Arizona, July 18. One. Det., Fox.

Pepsis formosus, Say, ♂.—Grand Canyon, July 11. Only one specimen. This is the smaller black form with blue reflections, and with brownish-yellow wings, which are blue at base. Many have been taken at Las Cruces, N. Mex. Det., Fox.

Perdita, sp.—Las Cruces, N. Mex. Name com. by Prof. Cockerell. Det., Fox.

Philanthus, sp.—Hart Little Spring, July 14. One. A good-sized black ichneumonid with red abdomen. Det., Fox. (?) *.

Pompilus, sp. (new to U. S. Nat. Mus. Coll.)—La Vega de San José, N. Mex., August 4. One. A small purplish-black wasp. Det., Riley.

Pompilus aethiops, Cress.—La Vega de San José, N. Mex., Aug. 4. One. A wasp of a soft black colour with a faintly purplish tinge. Det., Riley.

Pompilus formosus, Say.—Las Cruces, N. Mex. Common August 21 and other dates. Four large ones measure from 4 to 4½ cm. long.

Ptenus, sp.—La Vega de San José, N. Mex., August 4. One. A sawfly. Det., Riley.

Scolia dubia, Say.—La Vega de San José, N. Mex., August 4. Two. Det., Riley.

Scolia haematodes, Burm.—La Vega de San José, N. Mex., August 4. Five specimens. This is a large black species, with apical two-thirds of abdomen yellowish-orange. Wings purplish-blue. The extra-melanic colours of the bristly pile vary from yellowish or dull orange to deep crimson. Det., Riley.

Scolia Lecontei, Cress.—La Vega de San José, N. Mex., August 4. Four. Det., Riley.

Smicra, sp.—Grand Canyon, Arizona; Hance trial. Three specimens. July 8 and 11. Det., Fox.

Sphaerophthalma, sp., ♂.—Zuni River, Arizona, July 28. One. This winged specimen has the thorax and last two-thirds of abdomen yellowish or slightly orange pilose, the rest being wholly black. Det., Riley.

Sphaerophthalma bexar, Blake, ♂.—Continental Divide, Tenaja, N. Mex., August 2. One. Chaves, N. Mex., August 6. One. Det., Riley.

Sphaerophthalma coccineohirta, Blake, ♀.—Carrizo, Arizona, July 22. One. This mutillid differs strikingly from the forms more ordinarily met with, by having the dorsum not alone of abdomen, but also of thorax and head, with crimson-red hair. Det., Riley.

Sphaerophthalma creusa, Cress.—Las Cruces, N. Mex. Name com. by Prof. Cockerell. Det., Fox.

Sphaerophthalma gloriosa, Sauss., ♀.—Grant County, N. Mex. [W. J. Howard, 1882]. One specimen. This peculiar mutillid is clothed on whole dorsum with grayish-white long hair. Det., Riley.

Sphaerophthalma gorgon, Blake, ♀.—Las Cruces, N. Mex. Three specimens. This is a large mutillid, all black, except dorsum of abdomen with orange-yellow hair. A larger ♀ specimen, taken in St. Joe, Arizona, July 21, has the hair of abdomen crimson-red, except base of abdomen, which with all the rest bears black hair. It is identified as same species. Det., Riley.

Sphaerophthalma occidentalis, Linn., ♂.—Zuni River, Arizona, July 28. One. Continental Divide, Tenaja, N. Mex., August 2. One. Det., Riley.

Sphecius speciosus, var. *grandis*, Say.—Las Cruces, N. Mex. One. Large species, colours yellow, rufous, and dark brown. Det., Riley.

Sphex, sp.—Las Cruces, N. Mex. One. A large black wasp, with orange-yellow legs and abdomen. Det., Riley.

Sphex ichneumonea, Linn.—La Vega de San José, N. Mex., Aug. 4. One. El Rito, N. Mex., August 5. One. Det., Riley.

Tachytes fulviventris, Cress.—Chaves, N. Mex., August 6. One. Sabinal, N. Mex., August 7. One. First three abdominal segments of this specimen clear, light orange, and other two segments black. Det., Fox.

Tenthredo flavomarginis, Norton.—San Francisco Mt., Arizona, July 15. One specimen. Blackish sawfly. Very nearly the same as *T. xanthus* and *occidentalis*, but without bands across the abdomen, which is wholly black. Det., Fox.

Tenthredo occidentalis, Cress.—Hart Little Spring, Arizona, July 14. Eight specimens. Like *T. xanthus*, only the abdominal bands are red instead of yellow. Det., Fox.

Tenthredo xanthus, Norton.—Hart Little Spring, Arizona, July 14. Two specimens. This is a black species with two pure yellow bands across the abdomen. Det., Fox.

Thyredon arnatipennis.—Grand Canyon, Arizona. Hance trail, up near rim, July 12. One specimen. A very large ichneumonid, with laterally compressed and petiolate abdomen. Mostly flavous. Thorax stout. Antennæ long, yellow. Wings flavous-hyaline, with entremities and posterior border black. Det., Fox.

Trypoxylon Texense, Sans.—La Vega de San José, N. Mex., Aug. 4. Three specimens. Det., Fox.

Urocerus abdominalis, Harris.—Summit of San Francisco Mountain, Arizona. Nearly 13,000 feet. Many specimens seen, three captured July 15. The abdominal segments 2 to 5 of this species are bright yellow. rest of body wholly soft black. Eyes and legs partly yellowish. Det., Fox.

Vespa occidentalis, Cress., var.—Hart Little Spring, Arizona, July 14. One collected. Many seen. A large yellow and black hornet. Det., Fox.

Xylocopa Arizonensis, Cress.—Las Cruces, N. Mex., August 19. One. Det., Fox.

NOTE.—Mention was inadvertently omitted, in the introductory remarks, of a paper on ants from Las Cruces, N. M., sent to *Entom. News* (1894) for publication, and which records twelve species.

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THE LARGER SPECIES OF ARGYNNIS, AND THE MYSTERY OF THEIR LIFE HISTORY.

BY H. H. LYMAN, M. A., MONTREAL.

Although the larger species of *Argynnis* which fly in the Eastern part of this Continent are known in all their stages, through the most valuable labours of Mr. William H. Edwards, there are certain problems in regard to their life history which have baffled the efforts of all the entomologists who have attempted to solve them.

On page 124, of Vol. VI. of CAN. ENT., Mr. Edwards wrote as follows :—

"There are one or two points in the life history of the larger *Argynnides* that are not yet clear. With us, *Cybele* male is on the wing from the 25th of May to the 10th of June, as I have noticed for several successive years. Probably *Aphrodite* nearly as soon, and *Diana* first appears about the 20th of June. Shortly after the 1st of June the female of *Cybele* is to be seen, and both sexes abound in the clover fields. By the end of June *Cybele* has become scarce, and the individuals to be seen have lost their freshness and are broken and worn. It is certain that these early appearing females have not matured eggs and laid them, because at no time from June to August will anything but rudimentary eggs be found by dissecting, and the eggs do not become distinguishable to the eye until August. They then mature rapidly, and in a few days attain full size. I am confident that no eggs are laid till August. But about the first of that month, and all along to near the end of it, there appear in great numbers both fresh males and females, as if just from chrysalis, with no abrasion of the hairs on thorax between the wings, which spot is the first to show wear. (I doubt if an *Argynnis* could fly two days without thus giving evidence of it.) There are flying at the same time many worn individuals, especially females. These last are the first to deposit their eggs, but shortly after, and up to the time of frosts, the others also are in condition to do the same. I see no other explanation of the appearance of these freshly emerged butterflies than that they have formed part of the brood of caterpillars hatched the previous fall, some of which brood yielded the butterflies that came out in May and June, and the remainder continued in the larval or chrysalis state until August, and upon these last the perpetuation of the species largely depends, for nine-tenths of the June flight must have been destroyed long before August. If I am right the preparatory stages of the August *Cybele* must consume eleven months out of the twelve."

On page 73, of Vol. XII., CAN. ENT., Mr. Edwards referred to the above extract and then continued as follows :—

"I now am of the opinion that there are two annual broods. The experience in fall of 1878, with those larvæ of *Alcestis* which proceeded to feed instead of going into lethargy, and passed two and three moults within a very much shorter period than has been observed in the spring, showed that six weeks in midsummer might not improbably be long enough for all the changes. Perhaps also there are but four larval moults in the summer brood, as in some of the *Melitæas*, though there are five in the winter brood. Every stage would be shortened by the hot weather of July. On 14th June, 1878, I saw a pair of *Cybele* flying in copulation. In all instances where this has happened with butterflies under my observation, and the females have been secured (and this includes *Arg. Atlantis* and *Myrina*), eggs have been laid within a few hours after. Eggs laid 15th June would allow about two months for the several stages to imago."

In Mr. Scudder's *Butterflies of New England*, on page 549, after quoting in full the first of the above extracts, the author proceeds :—

"No such interrupted series of emergences has been detected in the history of our three species in New England, but if, as is probable, this is a first step towards true digoneutism, it might well be looked for in Southern New England, and should especially be sought for in *A. Cybele*."

Mr. Scudder proceeds to say that in the North there is a prolonged but uninterrupted emergence of fresh material from the chrysalis and suggests, that the phenomena may be attributed to lethargy in the caterpillar, periodic and fixed in the South, casual and irregular in the North.

The life history is given by Mr. Scudder as follows :—

"The insect is single brooded in New England, passing the winter in the larval state. The caterpillars become full grown in June, and the earliest butterflies appear in the latter part of June, sometimes as early as the 16th in the latitude of Boston, usually not much before the 21st; become common by the 1st of July, when the female first emerges; continue to escape from the chrysalis until at least the middle of July, and fly until the middle of September and occasionally later. The butterflies generally pair at the end of July, but the eggs do not begin to assume their proper size until about the middle of August, and are not laid until the last of August or first of September. Miss Soule obtained eggs in Stow, Vt., on August 20, which is the earliest New England date known to me."

"The eggs hatch in about fifteen days, but the caterpillars from them go immediately into hibernation without eating anything more than their egg shells."

From 1868 to 1875, inclusive, I spent the summers, from about the 15th July to the first week in September, on Cape Elizabeth, near Portland, Me., and I observed the phenomena of the second emergence described by Mr. Edwards. When I first arrived the *Argynnydes* were flying, but in a worn and dilapidated condition, but about the 1st of August fresh examples appeared and I observed them in copulation with some of the worn ones, but later only those of the second flight were seen in coitu.

On 1st July, 1891, when on a Dominion Day excursion to Vaudreuil, Q., I observed a pair of *A. Cybele* in copulation, resting on a bush within a yard of where I was standing. Oblivious for the time of the interest and importance of the fact, I did not secure them, and so lost the opportunity of trying to obtain eggs at that time.

On 2nd July, 1894, I went out to St. Therese to look for females of *Cybele*, but though plenty of males were on the wing, no female was seen.

On 14th July I went up the mountain for the same purpose and was fortunate enough to secure one in fair condition. This I immediately confined over a violet planted in a pot, by a wire gauze cylinder, but fearing that the eggs might possibly be laid upon the wire gauze, I substituted a net cage on the 15th. This cage was kept out of doors on a back gallery, but on the 18th was upset and demoralized by a too inquisitive feline anxious to find out what sort of a bird was kept in such an insecure cage.

On my return home in the evening I proceeded to examine the wreck, though I supposed the butterfly had escaped, but on carefully stirring the spilled earth the poor thing struggled out of its grave and was carefully secured, and on examination was found to be sound, though with sadly damaged plumage.

Two days later I carried it out in a box to Paul Smith's, in the Adirondacks, whither I went to look for *Colias Interior*, and rigged up a fresh cage for it by planting a violet in a tomato can. I cannot be sure when the first eggs of *Cybele* were laid, but the two first found were observed on 30th July, which is three weeks earlier than any previous record for anywhere near this latitude, according to Mr. Scudder, but, curiously enough, is the same date as recorded by Wm. Buckler for *Argynnis Paphia* in the first volume of "Larvæ of British Butterflies and Moths," as noted by Mr. Scudder.

This female lived for 29 or 30 days in confinement, and laid eggs at various times up to about 12th August. Comparatively few eggs were laid and most of them hatched in due course, the first on 18th August, giving an egg period in hot summer weather of not less than 19 days and probably longer. This larva behaved in a very curious manner and was a subject of much interest. It was placed on a violet planted in a small pot and left out over night without any cage and in the morning it could not be seen and I feared it had escaped, but placed a small wire gauze cylinder over the plant.

On the 20th it was carried with the rest of my menagerie on a holiday trip to Murray Bay, Q., and on 23rd was found crawling about on the plant and it looked larger than when placed upon it.

On 25th, I observed it feeding on one of the young, unexpanded leaves near the roots, in the morning and also at lunch time, but by evening it had disappeared from view.

On 26th, observed larva in the evening resting near the roots.

On 27th, found in same place in the morning ; at 1:40 p. m. it was half way up the stem of one of the leaves, and at 3:10 p. m. in the same position.

On 28th, in morning, it was in same position ; later it was seen crawling about the lower curved stems ; by evening it had disappeared.

On 29th, still in hiding ; later discovered it resting on a leaf-stalk near leaf.

On 30th, in same position on leaf-stalk, but found that a little had been eaten out of each side of the approximate edges of the leaf ; the eating on each side made the injury to the leaf extremely inconspicuous. At 1:15 p. m., found it on this leaf for first time, later it disappeared.

On 31st, still in hiding.

On 1st September, found larva had left plant, which had been left uncovered since 23rd, and was on the shelf ; replaced it on the plant and put wire gauze over it. Found remains of an egg shell on the plant.

On 2nd September, larva on leaf, then on stem of another leaf ; later had disappeared.

On 4th, I left for Quebec by the day boat and placed my paraphernalia in what I thought was a safe place in the saloon, but some one knocked the wire gauze cover partly off the pot and this larva apparently escaped, for I never found it again. It had lived and fed sparingly for seventeen days, and had grown slowly but perceptibly, although it had not passed a moult.

Three more eggs hatched on 5th Sept. and another on 6th, but though I found, on the 7th, a leaf a little eaten, the larvæ did not seem inclined to feed, but seemed to rest most of the time in a lethargic condition.

These eggs which hatched last must have been laid not later than 11th or 12th of August at the latest, which would make the egg stage not less than about 24 or 25 days, but the climate at Murray Bay would doubtless

retard their development somewhat. At least one egg did not hatch, though the larva seemed to be fully developed inside it. As soon as I found that these larvæ would not feed and that they seemed to be shrinking in size, I put them into a small pill box and the unhatched egg in another and placed them along with a pill box containing larvæ of *Colias Interior*, in a wide mouthed glass jar, with a bung to close the mouth, and put it in the refrigerator. Some time afterwards I found that by some means water had got into the jar and the boxes were wet and mouldy, and so took them out. The larvæ were still alive, so I placed them out of doors, and later, when the snow came, I put them in a box and buried them under the snow. The *Colias* larvæ survived the winter, but these did not.

On the 10th of June last I went out in the evening to St. Therese on an entomological quest, and the next day I found *Cybele* ♂ on the wing. Messrs. Winn and Gibb have also found it as early, and I think that this early appearance in this latitude proves that these early fliers could not have come from larvæ which hibernated direct from the egg, but that the larvæ must have passed one or more moults before hibernation. Mr. Edwards found the pupal period to be 22 to 24 days, in Virginia, in some cases and from 16 to 20 days in others. Now, it is probable that in this latitude the period would be as long as the longest in Virginia, but even the shortest would carry back pupation into the month of May, and as the snow often lies till late in April and the early part of May is frequently cold, it would only leave four or five weeks of cool weather for the full growth of this larva, which is said to be decidedly sluggish in its growth, which seems to me utterly impossible. *Colias Interior*, which passes one moult before hibernation, develops rapidly, and has a pupal period of only about ten days; does not attain the imago state in the Adirondacks for several weeks later, though the ones reared by me in confinement had their period of emergence accelerated by about three weeks.

My experiments so far have produced rather negative results, but they prove that eggs are laid in July, that the resulting larvæ sometimes feed and grow perceptibly, and, I think also, that the species flies too early in this latitude to have come from larvæ which hibernated direct from the egg.

I do not like theorizing upon such insufficient data, but I am inclined to the hypothesis that there are two almost distinct cycles of this species

which overlap somewhat, some of those of the earlier cycle living until after the appearance of those of the later one, and in some instances mating with them.

Upon this hypothesis the larvæ which hibernated direct from the egg would all start feeding at about the same time and so would account for a simultaneous appearance of many fresh specimens about the beginning of August, while those which emerge over a considerable time in the early summer would be from those larvæ which had passed one or two moults the previous year.

Mr. Edwards's later view, that there are probably two broods in Virginia, the one descended from the other, I hold to be untenable in view of the long egg period, even in the heat of early August. Nor am I inclined to accept as probable the suggestion of Mr. Scudder, based upon the experience of Vaudouer in the case of the European *Euphrosyne*, of a lethargic period in the case of that portion of the brood which does not reach the imago state till August.

I hope to pursue my experiments further, and to that end appeal for the assistance of other lepidopterists, and will gladly pay, either in money or exchange, for living specimens of the female of this species sent me not later than the first week in July. These can be sent by mail in suitable boxes addressed to me at 384 St. Paul St., Montreal.

TRYCHOSIS TUNICULA-RUBRA, N. S.

REV. THOMAS W. FYLES, SOUTH QUEBEC.

While studying the habits of *Gelechia galla-diplopappi*, I have repeatedly met with a parasite, in the galls of the moth, that I have not found elsewhere.

I have submitted imagos of the species to several of our most eminent hymenopterists, and all agree that the species is new to science and undescribed. To Mr. Ashmead I am indebted for the information that it will properly come into Föster's genus *Trychosis*.

The full-grown larva of the species is a fusiform, legless grub, three-tenths of an inch long, and having thirteen segments, counting the head. The anal segment is somewhat elongated. The creature is of a white waxen appearance, with a tinge of pink; and it has a few short hairs on its face and along the back and sides. The spiracles are well defined. On the ventral surface of the grub are a number of extensile and retractile pads or pseudopodia, by the aid of which it fastens itself to its victim, or

moves about within the hollow gall. Its mouth is large and set well up in the face, and the upper lip has a beak-like curve.

On the 10th of July, 1891, I witnessed the cleaning out of a chrysalis case of *G. gallæ-diplopappi* by a grub of this species. The creature, having finished its meal, left the case and immediately proceeded to spin its cocoon. When completed, this cocoon was long and sack-like, but compact in texture. It was white at first, but it darkened with age. The perfect insect burst from it on the 10th of June of the following year.

On another occasion, on opening a gall, I found a grub of the species just finishing a dessert of the very case of its victim. In this instance the grub, in a short time, voided the indigestible parts of its meal in dark pellets, and then commenced to spin.

I opened a cocoon of the parasite on the 25th of March last, with a view to describing the pupa. I found that the pupal change had not taken place. Preparations for it, however, seemed to be commencing. The head was becoming rounded; the mouth was sealed up, but its outline was still apparent; the pseudopodia were disappearing; the body was becoming attenuated.

I put the creature back into its ruptured envelope, but it was not content to remain in it—it wriggled out, so I placed it in a clean paper box, and, I am glad to say, its changes went on as if nothing unusual had happened.

By the 1st of April the head, thorax and abdomen of the insect could be traced under the skin. The first two had become yellowish, and the eyes, which I had first noticed as faint streaks, now showed as brownish oblong patches.

In the night of April 1-2 the pupal change took place. In the morning I found the shrivelled larva skin still clinging to the extremity of the body. The main parts were now of distinct form, and the antennæ and limbs appeared in proper shape, extended beneath the insect, and beautifully white and pellucid. The only colouring was in the eyes, which were large and brown.

On April 6th I found that the ocelli were distinctly seen, and that the upper part of the abdomen was beginning to darken.

On the 8th the thorax began to turn black. On this date I made a drawing of the pupa. The insect seemed to object to the strong light in which I had placed it. I noticed twitchings of the legs and antennæ. I therefore put it back in its box as soon as possible.

On the 9th I found that the head and thorax were quite black, while the legs and antennæ were still pellucid.

On the 11th the red of the three first segments of the abdomen on the upper side and the black of the remaining segments on the upper side were seen. The upper portions of the legs also and the bases of the antennæ were taking colour.

On the 13th the insect was fully coloured, with the exception of a white streak on either side of the abdomen. The legs had begun to spread themselves.

In the night of the 13th the wings burst from their cases, and before the close of the day following the insect had risen upon its feet.

No doubt the warmth of my house, and the rupturing of the cocoon, hastened the changes of the insect. I should say the usual time of the creature's appearance in the perfect state is the middle of June. The galls formed by the Gelechian begin to show themselves in the first week of June, and there is only one brood of *G. gallæ-diplopappi* in the year.*

Descriptions of the imagos, male and female, of *T. tunicula-rubra*.—

♀.—Expanse of wings, one-half inch; length of body, one-quarter inch; length of antenna, two-tenths inch; length of ovipositor, one-tenth inch.

HEAD black, punctured, and set with whitish hairs; face convex; clypeus somewhat nasiform, hairy; compound eyes of a rich madder-brown; ocelli black and prominent; palpi long, five-jointed, flavescent; antennæ filiform, basal joint oblong-ovate, black and hairy. In the flagellum, which is brown, are thirty-one joints, of which the first, counting from the ring-joint, is four times longer than thick.

THORAX black, shining, deeply punctured; mesothorax and scutellum convex; legs long and slender, the coxæ black, trochanters and femora fuliginous, tibiæ and tarsi ferruginous; wings iridescent, slightly hairy; costal and externo-medial nervures hairy; stigma large and brown; areolet rather large, pentagonal; cubito-discoidal cell large; the third discoidal cell and the first apical cell of moderate size; the second apical cell large; the basal nervures slightly and regularly curved.

ABDOMEN fusiform; petiole rather long and slender, recurved, jet black; the three first abdominal segments deep red, the remainder black; ovipositor ferruginous, straight, stiff and pointed—its case fuscous, blunt and hairy.

♂.—General appearance darker and less robust than that of the female. Antennæ dark brown, nearly black, twenty-six joints in the flagellum, the first being five times as long as thick; eyes prominent, brown; ocelli black; palpi five-jointed, brown; coxæ black, hairy and punctured—the hindmost pair unusually large; first pair of legs ferruginous; the rest fuliginous, with knees of lighter colour; tibial spurs stout; wings smoky; abdomen long and slender; petiole black, extended, horn-shaped; three following segments red, the first and third edged with black; the rest of the abdomen black.

* Wherever I have found *T. tunicula-rubra* I have found the skin over the opening of the gall ruptured, I suppose by the ovipositor of the mother *Trychosis*.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XVI. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC—(*Continued*).

TRIBE IV.—CLYTHRINI.

The species included here are of rather short, cylindrical form, sometimes suggesting in shape the Cryptocephalini, though easily separated, so far as our genera are concerned, by the shorter and stouter antennæ. Most of them are Southern or Western in distribution, and the few genera recorded from within our limits may be known among themselves by these characters :—

A. Front coxæ contiguous.

Large ; colour, in our species, chiefly yellowish or testaceous ; tarsal claws simple *Anomæa*.

Small ; colour in our species bluish, with four yellowish or reddish elytral spots *Babia*.

AA. Front coxæ separated by the prosternum.

Large ; eyes transverse, emarginate *Megalostomis*.

Small ; eyes oval, not emarginate *Coscinoptera*.

It seems certain that *Megalostomis* cannot be retained as a member of the Canadian fauna, as the species included therein have never been found farther north than Kansas.

ANOMÆA, Lac.

Represented by *Anomæa laticlavata*, Forst., found occasionally on the rag-weed (*Ambrosia*). It is apparently, however, quite a general feeder, having been taken also on various legumes, and on oak, cotton, and willow. In colour it is fulvous, elytra a little lighter, their sutural and outer margins narrowly bordered with black ; under side of body, excepting the prothorax, dark, but densely covered with light pubescence. Legs yellow, often with tibiæ and tarsi more or less blackish. The male has more deeply serrate antennæ and longer anterior tibiæ than the female. Length, .28-.32 in. Form cylindrical.

COSCINOPTERA, Lac.

C. dominicana, Fabr.—Black ; of robust form, much less elongate than *Anomæa*. The upper surface is sparingly covered with a light-coloured pubescence, the under side much more densely so. Thorax densely, not very coarsely, punctured and with median smooth line.

Elytra more coarsely but less densely punctured. Length, .20-.22 in. The only Canadian specimen I have seen was sent me from Toronto by Mr. R. J. Crew. Fig. 13 [after Riley] represents this insect in all its stages: *a*, the larva extracted from its case; *b*, larva dragging its case, which is composed of chewed fragments of leaves; *c*, beetle, enlarged to show punctures; *d*, beetle, natural size; *e*, egg, highly magnified; *f*, head of larva, under side; *g*, head of male beetle; *h*, jaw of same; *i*, eggs, natural size, showing mode of attachment to leaves; *j*, leg of larva; *k*, jaw of same; *l*, maxilla of same.

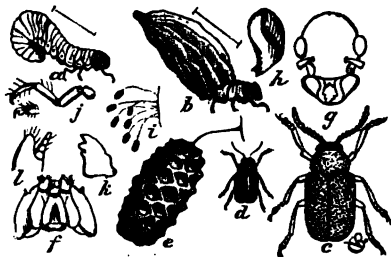


Fig. 13.

MEGALOSTOMIS, Chev.

A record of *M. subfasciata*, Lec., occurs in the supplement to the Label List of Coleoptera for 1889. It is a rather large insect (.24-.30 in.), nearly black, with cinereous pubescence. The elytra each have a large basal red spot reaching from the immediate vicinity of the outer margin to the neighbourhood of the suture. The size and coloration will separate it from any of the known Northern Clythrini. The recognized range is from Arizona to Kansas.

BABIA, Chev.

A pretty, shining black insect of somewhat oblong form, shining surface, the elytra with a humeral and subapical red spot on each, the anterior the larger. The striae are coarsely punctate. Antennae short, the last character serving to separate it easily from some of the black and red Cryptocephali with which beginners occasionally mix it. The species is *B. quadriguttata*, Oliv. Length, .14-.16 in.

TRIBE V.—CHLAMYDINI.

These curious little insects can be mistaken for nothing else. They are of very short, compact form, the upper surface of the body covered with large tubercles; in colour they range from dull brown to black or bronze. The legs are contractile, the antennae short. As has often been remarked, they resemble the excrements of caterpillars, and so closely as

to render their detection, even when swept into the net, a matter of some uncertainty. The two genera are thus distinguished:—

Antennæ serrate from the sixth joint.....*Exema*.

Antennal serrations beginning before the sixth joint.....*Chlamys*.

EXEMA, Lac.

A small black, rough beetle, about .10 in. long, often variegated with very small yellow spots or even with the head and prothorax almost entirely yellow. The legs are usually more or less yellow, the antennæ entirely so. The Canadian *E. dispar*, Lac., is considered a variety of *E. conspersa*, Mann.

CHLAMYS, Knoch.

Represented by *C. plicata*, Fabr., a larger insect than the preceding, and of shorter, more robust form. The tuberosities of the upper surface are very pronounced, the colour more or less metallic brown or black, legs black. The variety *polycocca* is that in which the tubercles are more distinctly separated and not aggregated into the form of ridges as in typical *plicata*. Length, .16 in. Fig. 14 represents the larva (*a*) and its curious sack.



FIG. 14.

TRIBE VI.—CRYPTOCEPHALINI.

Form robust, more or less cylindrical, and sometimes even approaching globularity. Elytra rather short, leaving the tip of the abdomen exposed, not tuberculate, striato-punctate. Antennæ usually long and slender. Colours usually arranged in a variegated pattern, taking on various combinations of spots or stripes, which are sometimes very inconstant; occasionally a species is found which is unicolorous. The genera are thus separated in the "Classification":—

A. Claws appendiculate (*i. e.*, with a square dilatation at base; small species).

Form robust, rounded.....*Monachus*.

Form more elongate, cylindrical.....*Diachus*.

AA. Claws simple (mostly larger species).

b. Prothorax not margined at base, crenulate.

Front edge of prothoracic flanks sinuous or toothed.*Bassareus*.

Front edge of prothoracic flanks straight...*Cryptocephalus*.

bb. Prothorax margined at base, not crenulate; prosternum feebly channelled.....*Pachybrachys*.

MONACHUS, Chevr.

Two very robust species of blue colour belong here; they may be obtained by sweeping meadows. Dr. Leconte separates them thus:—

Form oval; prothorax smooth, opaque, rows of elytral punctures feeble.....*ater*, Hald.

Form ovate; prothorax with punctures near the base, rows of elytral punctures strong.....*saponatus*, Fabr.

Both are of about the same size (.10-.12 in.) and have rather elongate antennæ, which are testaceous at base.

DIACHUS, Lec.

Contains the smallest Canadian *Cryptocephalini*. They are of cylindrical-oval form, and somewhat metallic colours, overlaid on blue or green. The two recorded from within our limits are:—

Elytral striæ obliterated behind the middle; sides of prothorax, antennæ and legs testaceous; .06-.08 in.....*auratus*, Fabr.

Outer elytral striæ impressed, curving around at tip; prothorax smooth; colour, dark blue-green, antennæ and legs reddish-brown; .08-.11 in.....*catarius*, Suffr.

BASSAREUS, Hald.

The two species look much like *Cryptocephalus*, but may be distinguished by the character given in the table. *B. detritus* measures from .18-.22 in., and is of a blackish colour, the elytra with four red spots; the prothorax is opaque, sparsely punctured. The other species, *B. mammifer*, has a smooth, shining prothorax, and varies from .14-.22 in. in length. The typical form has elytra spotted like those of *detritus*; *i. e.*, a large anterior spot on each wing-cover and an apical one. It runs, however, through the following varieties, which have received separate names: *sellatus*, Suffr., in which the anterior elytral spot is reduced in size and the sides of the prothorax are white; *pretiosus*, Melsh., with a larger anterior elytral spot, which is connected with some small basal spots, the prothorax with sides and two spots at base white; and *luteipennis*, Melsh., with yellow elytra.

CRYPTOCEPHALUS, Geoffr.

A number of species occur in Canada, some of which will be found mixed, in the collections of beginners, with *Babia 4-guttata* and the species of *Bassareus*. They are, however, readily separated when once attention has been called to the characters in use for the purpose. The

following table will, it is thought, serve for the separation of the Canadian forms among themselves without reference to prosternal characters, for an exposition of which the student is referred to Dr. Leconte's paper on the genus in Trans. Amer. Ento. Soc. for 1880.

- A. Elytra yellow with two oblique black stripes ;
prothorax reddish, usually with two basal
oblique yellow spots. .17-.21 in. (Fig.
15)..... *Venustus*, Fabr.
- AA. Elytra spotted.
- b¹. Spots numerous, arranged 2, 2, 2, 1 on each
elytron, yellowish on brown or black
ground. Prothorax reddish. .16-.22
in..... *guttulatus*, Oliv.
- b². Spots at base confluent into a transverse band which extends to
the sixth stria, a marginal spot just before the middle extend-
ing to fifth stria, an interrupted post-median band and apical
spot, all yellow. Ground colour of elytra brown. Pro-
thorax brown. .12-.16 in..... *badius*, Suffr.
- b³. Spots very different in size, the middle ones usually confluent
into a large blotch on the sutural region, the others usually
quite small and arranged in longitudinal rows ; they are
brown or black on a pale yellow ground. The prothorax is
ferruginous or nearly black ; sides and front, and often also
two oblique basal spots, yellow. .16-.28 in. *mutabilis*, Melsh.
- b⁴. Spots red, not exceeding two on each elytron ; ground colour
black or blue-black, prothorax black.
- c. Humeral spots confluent on median line so as to form a band
extending quite across (var. of next species). *notatus*, Fabr.
- cc. Humeral spots separate.
- Larger and more robust ; humeral spot large, extending
along sides, apical spot variable in size. .14-.22
in..... *quadrifasciatus*, Say.
- Smaller and more slender ; humeral spot oblong, slightly
wider behind, hardly reaching the base. Apical spot
rounded. (The var. *guttulus* differs only in having
the humeral spot longer, reaching to the middle of the
length of the elytra.) .10-.12 in. *quadruplex*, Newm.

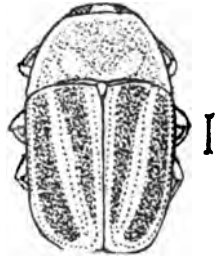


FIG. 15.

AAA. Elytra plain. Colour testaceous or slightly brownish; prothorax densely rugosely punctured. .12-.16 in.... *Schreibersi*, Suffr.

It should be remarked that nearly all of these are very variable in colour, but the table covers all of the recorded named varieties for East Canada. Any specimens which appear not to come under any of the names given should be referred to specialists.

PACHYBRACHYS, Chev.

Contains a number of small species in which the outer striæ of the elytra are usually completely confused and the inner ones tortuous and irregular. They have been tabulated by Dr. Leconte, in the paper cited, and in this as well as the preceding table we have drawn upon his work for many characters.

A. Colours of upper surface definitely arranged.

b¹. Striped yellow and black or brown.

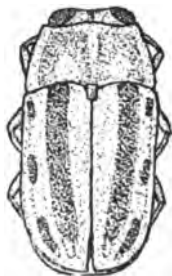


FIG. 16.

Suture broadly black, each elytron with two broad stripes and narrow margin black. Thorax with M-like brown mark. .10-.14 in.... *litigiosus*, Suffr.

I Suture very narrowly black, each elytron with a broad oblique stripe, narrow outer margin and an intervening row of spots black. Thorax either entirely yellow, ferruginous, or yellow with ferruginous, M-like mark. .14-.22 in.

(Fig. 16)... .. *viduatus*, Fabr.

b². Opaque black, prothorax with sides, front margin, anterior portion of median line and two basal spots, red. This red may be variously reduced. .16-.20 in.... *trinotatus*, Melsh.

b³. Yellow above, head with black spot on crown, prothorax with a black spot on each side, and a somewhat Y-shaped one at middle. Elytra with humeral spot and a large V on suture, which joins at its apex with an irregularly indented transverse subapical band, black or brown. These markings may become indistinct at times. .06-.12 in.... *tridens*, Melsh.

AA. Uniform opaque black. .10-.14 in.... *carbonarius*, Hald.

AAA. Colours more or less mottled.

c. Sides of prothorax strongly rounded and incurved near base; hind angles rounded.

Black, mostly opaque, upper surface mottled with small white dots ; prothorax sometimes red at sides, femora often with a yellow spot. Elytra confusedly coarsely punctured over most of the surface. .13-

.16 in.....*luridus*, Fabr.

Black, opaque, elytra with fewer confused punctures, white spots more numerous ; pygidium with testaceous spots, legs testaceous in great part.

.10 in.....*femoratus*, Oliv.

cc. Sides of prothorax obliquely broadly rounded or straight, not incurved behind.

Punctures of prothorax and elytra uniform, two striæ visible at sides ; upper surface dull ochreous clouded with brown. .08-.12 in.....*hepaticus*, Melsh.

Punctures of elytra more or less irregular, striæ visible at sides and behind. Black, opaque, prothorax with sides and dorsal spots red, elytra with a broad irregular band from the side almost to the suture.

.11-.14 in.....*subfasciatus*, Hald.

The above scheme includes all of the species known from East Canada which are included in Dr. Leconte's table, which has been followed for the most part. Three recorded forms, *atomarius*, *infaustus*, and *sobrinus*, are left unaccounted for ; they belong to a group of small species, mostly mottled, in which the prothorax is formed as in the division cc, the elytral sculpture consisting usually of an irregular punctation, with the striæ visible chiefly at sides and behind. The prosternum is broad and only very slightly concave, which character will separate them from the species preceding *hepaticus*, since the prosternum in all those is sulcate. A careful study is required, with reference to the types, before anything further should be attempted.

We have much pleasure in recording that the Honorary Degree of LL.D. was conferred upon two members of the Entomological Society of Ontario — Professor WILLIAM SAUNDERS, F. R. S. C., F. L. S., F. C. S., Director of the Experimental Farms of the Dominion, and Mr. JAMES FLETCHER, F. R. S. C., F. L. S., Dominion Entomologist and Botanist,— at the recent convocation of Queen's University, Kingston, Ontario. We beg to offer our esteemed friends our very hearty congratulations upon this well-deserved honour.

FIVE NEW BEES OF THE GENUS *CALLIOPSIS*, FROM NEW MEXICO.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Calliopsis meliloti, n. sp., ♀.—Length, 5 mm.; head and thorax wholly black, abdomen very dark brown, with yellowish-white markings. Head, thorax, legs, and sides of abdomen with abundant long dull white hair. Clypeus prominent, shining, with conspicuous sparse punctures, its upper portion longitudinally sulcate in the middle, its whole surface appearing bare, with only very short, inconspicuous hairs. On each side of the clypeus is a shining bare eminence. Vertex closely punctured. Mandibles brown. Antennæ quite short, the hairy scape not much less than half as long as the flagellum, the last joint of which is truncate and somewhat flattened.

Tegulæ shining testaceous. Dorsum of metathorax bare, smooth. Legs dark, knees and terminal joints of tarsi becoming paler. Wings quite short, hyaline, iridescent, nervures and stigma light reddish-brown. Second submarginal cell about three-fourths length of 1st; narrowed one-half to marginal. Abdomen short and broad, with broad creamy-white bands; that on first segment narrowly interrupted in middle, and roundly notched on each side behind; that on second very broadly interrupted, and also notched at sides; those on third and fourth entire, notched at sides behind; finally an obscure broad subrufescent band partly on fourth and partly on fifth segment. Anal fimbria dirty white.

Habitat.—Las Cruces, N. M., on the College Farm, May 1st, 1895; swept from *Melilotus indica*, together with *Nomada*, *Sphécodes*, *Prosapis*, and four species of *Halictus*, viz.: *bardus*, *stultus*, *pectoraloides*, and *meliloti*.

It is related to *C. cinctus*, Cr., but differs in the abdominal bands being white instead of yellow. The anal fimbria not fuscous, the wings not at all dusky. It has some superficial resemblance to *Perdita albiovittata*.

Calliopsis hirsutifrons, n. sp., ♂.—Length about 6 mm.; pitch-black, very shiny, thorax and abdomen without any pale markings, face-markings creamy-white. Face, including clypeus, scape, cheeks, occiput, sides of thorax, post-scutellum, metathorax except basal middle, legs, and lateral hind margins of abdominal segments, with rather dense and fairly long white pubescence. Head transversely oval, ocelli small and close together, vertex with no distinct punctures; clypeus except the usual

dots, and triangular lateral face-marks, white, the latter in shape not very far from a half-circle, but the ends more produced and the inner (orbital) margin a little concave. Mandibles mostly white without. Flagellum black above, coffee-brown beneath.

Disc of mesothorax with conspicuous, very sparse punctures; at sides of mesothorax, and on scutellum, they are much closer. Tegulæ dark chestnut-brown. Legs black, anterior tibiæ in front, and first joint of all the tarsi, cream colour; remaining joints of tarsi subrufescent. Claws deeply cleft. Wings hyaline, with a faint smoky tinge, which does not extend to the external margin; nervures and stigma dark brown; marginal cell long, the tip roundly truncate, minutely appendiculate. Second submarginal a little shorter than 1st, narrowed a little less than one-half to marginal. Abdomen narrow, strongly but rather sparsely punctured, the segments transversely grooved adjacent to the sutures. Hind lateral margins of segments with white hair bands.

Habitat.—Albuquerque, N. M., middle of August, 1895 [Ckll., 4527]. Something like *C. pauper*, but hairy, and the tibiæ are differently marked. It resembles a good deal the ♂ of *C. albitarsis*, which I took on *Rudbeckia laciniata*, at Santa Fé, N. M., July 19th. In *albitarsis*, however, the face is not nearly so hairy, the face-marks are pale yellow, and the lateral marks are obtuse instead of pointed above.

Calliopsis fraterculus, n. sp., ♂.—Length about $6\frac{1}{2}$ mm., pitch-black, with the clypeus, triangular marks at sides of face, and tibiæ in part, pale lemon-yellow, tarsi light. Head broader than long, shining, the ocelli in pits, a conspicuous prominence adjacent to the summit of each eye, occiput and cheeks with large, more or less confluent, punctures. Vertex with very few punctures, front with large subconfluent punctures; clypeus punctured, high, light yellow, with its piceous apical margin produced into a tooth on each side; lateral face-marks triangular, rounded above, not extending as high as antennal sockets; labrum truncate, mandibles wholly dark; antennæ short, reaching about to tegulæ, flagellum dark brown. Thorax wholly dark, with large punctures; pubescence of head and thorax sparse and inconspicuous, white, specially noticeable only on each side of antennæ, on border of prothorax, beneath the wings, and at the sides of the metathorax. Punctures of scutellum and post-scutellum very large and like those of mesothorax, those of metathorax smaller and closer. Base of metathorax with obscure longitudinal wrinkles, but no well-defined smooth space behind them. Tegulæ shining dark reddish-

brown. Wings fuliginous, nervures and stigma piceous, a pale dot at base of stigma. A small hyaline spot at angle between marginal and second submarginal cell, and one just beyond upper corner of third discoidal. Venation practically as in *athlops*, but the marginal cell not so narrow in proportion to its length. Legs black, knees and external bases (half, more or less) of tibiæ pale yellow, tarsi pale yellow, the terminal joints becoming brown. Claws only slightly bifid. Abdomen densely punctured, the apical margins of the segments smooth and constricted. ♀.—Length about 7 mm., more robust, abdomen broader, segments not constricted, punctuation in general finer, legs with dirty white hairs, dense on hind pair. Legs dark, with a light yellow spot at extreme base of each of the anterior and middle tibiæ. Face wholly dark.

Habitat.—New Mexico; the ♀ on *Bigelovia Wrightii*, at Las Cruces, Sept. 23rd, 1895; the ♂ at Albuquerque, middle of August, 1895.

This species is a sort of small brother of *C. athlops* (Cr.), from which it is easily distinguished not only by its size, but by the sculpturing of the metathorax. *C. athlops*, also, does not have the shining boss at the summit of the eyes, which is present in both sexes of *fraterculus*. I have taken *C. athlops* at Las Cruces, N.M., Sept. 21, 1895, on *Helianthus annuus*.

Calliopsis perlavis, n. sp., ♀.—Length, 8 mm., black, shining; face and thorax without pale markings. Head subquadrate, not particularly large, a little longer than broad; clypeus rather prominent, produced into a tooth on each side; mandibles dark reddish at ends; face, clypeus, front, vertex and cheeks strongly punctured, the punctures smallest and most dense on front and beneath antennæ; antennæ reaching as far as base of wings, joints 6 to 10 of flagellum testaceous beneath. Mesothorax shining, with small shallow punctures, fairly dense in front and at sides, but becoming sparse towards the middle, and almost lacking in the middle. Scutellum with sparse punctures, base of metathorax longitudinally wrinkled. Pubescence of head and thorax sparse, very pale brownish, most noticeable on cheeks, occiput and pleura; only a few scattered hairs on sides of metathorax. Tegulæ amber colour. Wings subhyaline, grayish, yellowish towards the base, costal nervure and stigma dark brown. The outermost nervures also dark brown, but the rest amber colour. Second submarginal a little shorter than first, narrowed about half to marginal. Legs dark, a rather ill-defined small yellow spot at base of each of the four anterior tibiæ, tarsi becoming rufescent. Hind legs with a copious clothing of hair. Abdomen shining, parallel-sided, the apical

margins of segments 2 and 3 becoming rufescent. Punctures of dorsum minute and close, on first segment extremely sparse and small.

Habitat.—Las Cruces, New Mexico; two on sunflowers, October 6th, 1895. By its smooth surface it comes nearest to *C. margaritensis*, Fox, but that is a smaller insect.

Calliopsis Boylei, n. sp., ♂.—Length a little over 7 mm., very slender, black with yellow markings. Head somewhat broader than long; antennæ very long, entirely black; face flattened, the clypeus not projecting; entirely bright lemon-yellow nearly up to the level of the antennæ, the upper edge of the yellow straight right across the face, the yellow projecting above this only for a short distance, very narrowly, on orbital margins. The supraclypeal yellow area is about square. The labrum is also yellow, as well as part of the mandibles without. There is an impressed line down the middle of the clypeus, failing anteriorly. Face with large scattered punctures, almost lacking on supraclypeal area and close to the impressed line of clypeus; front, vertex and cheeks closely punctured. Pubescence of head and thorax sparse, tinged yellowish; anterior sides of clypeus with long white, very distinctly plumose hairs. Mesothorax shining, with distinct, rather close punctures, parapsidal grooves distinct. Scutellum with large, not very close, punctures. Base of metathorax transversely wrinkled, the area behind this not smooth, but minutely roughened. Sides of metathorax fringed with hairs. Tubercles with a chrome-yellow spot, tegulæ shining testaceous. Wings yellowish-hyaline, nervures and stigma dark chestnut-brown, costal nervures black, marginal cell unusually long, 2nd submarginal narrowed one-half to marginal. Legs black, with the knees, the anterior tibiæ in front, a spot at base and apex of middle tibiæ, nearly the basal third and the apical eighth of hind tibiæ, pale orange. Tarsi pale orange, the terminal joints darkened. Claws long and curved, only cleft at extreme tips. The hind legs are very long; the middle tibiæ are very short, hardly half as long as the hind tibiæ. Abdomen long and slender, black, the bases of the segments after the first with a fine light pile, very noticeable when the insect is held sideways. Dorsal surface of abdomen, except the broad impressed apical margins of the segments, finely and closely punctured, the punctures extremely small and close, except on the first segment.

Habitat.—Santa Fé, New Mexico; Aug. 2nd, 1895; given to me by V. Boyle, with the statement that it was caught on *Cleome serrulata*.

By its face-markings this resembles *C. compositarum*, Rob., but it differs at once from that in its less densely punctured mesothorax, and the longer marginal cell.

NEW HAMPSHIRE HESPERIDÆ.

BY W. F. FISKE, MAST YARD, N. H.

All of the following species occur in the town of Webster, about ten miles north-west of Concord :—

Carterocephalus Mandan, Edw.—This is one of the rarest species in this section. It occurs in but one locality—a grassy bank by the roadside. Middle of June.

Ancyloxypha Numitor, Fab.—Common around very wet, grassy swamps in June and again in August.

Pamphila Hobomok, Harris.—One of the most common ; the third *Pamphila* to make its appearance in the spring, usually about the first of June. Very general in its habit, frequenting both wet and dry land, but preferring a moist, bushy pasture, with plenty of bramble blossoms.

Var. *Pocohontas*, Scud.—Appears about a week later than *Hobomok*. Rather scarce.

Pamphila Sassacus, Harris.—The second *Pamphila* to make its appearance in the spring, about a week before *Hobomok*. Common.

Pamphila Metea, Scud.—The earliest *Pamphila*, appearing about May 15th. It frequents very dry, sandy land, where little vegetation exists, except “bunch grass” and sweet fern. The former—scientific name unknown, but variously known as “bunch grass,” “wolf grass,” “hassock grass”—is very probably the food plant. Owing to its early appearance and peculiar haunts, it long escaped the notice of previous collectors in this section. One brood only observed.

Pamphila Leonardus, Harris.—The last butterfly to emerge as a first brood. Somewhat common in clover fields last of August and first of September, but rather hard to capture in good condition. With exception of *Cernes*, it is the most difficult *Pamphila* to approach when not feeding.

Pamphila Otho, var. *Egeremet*, Scud.—Rather scarce, frequenting moist roadsides and bushy pastures. First specimen appearing about July 10th. I have a curious specimen (a ♀), probably a variation of this species, in which the spots on both sides of the primaries are larger and more sharply defined, and there is a row of four or five faint spots on the upper side of the secondaries. The clouded band or row of spots on the under side of the secondaries is condensed into a row of distinct small spots, giving it a very different general appearance.

Pamphila Peckius, Kirby.—One of the most common, about equally common with *Cernes*, *Metacomet*, and *Hobomok*. Three broods: it accompanies *Mystic* in June, *Metacomet* in July, and *Leonardus* in August and September. A few specimens on the wing as late as October, which may be fragments of a fourth brood. There is a rather scarce form in which the yellow spot on the under side of the secondaries is divided quite in two, and another form in which the spots on the upper side of the secondaries are missing, giving the male—were it not for the stigma—a very close resemblance to *Cernes* on the upper side.

Pamphila Mystic, Scud.—The most common. Appears about June 5th and again, though very rarely, about September 1st. The male varies considerably; in many cases, when superficially observed, closely resembling *Sassacus*.

Pamphila Cernes, Edw.—Common; appearing about June 15th and again, though rarely, in August. There are probably more variations in this species than in any other native one. One of the most odd is a female in which the subapical spots are entirely wanting and the others are very much reduced in size.

Pamphila Manataqua, Scud.—Rather rare. July 10th to August. All the males yet taken have had a row of four or five indistinct spots on the upper side of the secondaries, but not always on the under side. As is the rule with most species of butterflies, the males appear some time before the females.

Pamphila Metacomet, Harris.—Common; about June 20th or 25th to middle of July. Female varies much in the number and size of the white spots. I have seen specimens of *Cernes*, *Metacomet*, and *Bimacula* (with the white fringe worn off) which it would be almost impossible to tell apart without examining the under sides. I once observed a very ardent courtship carried on by a male *Peckius* towards a female *Metacomet*. The female, however, seemed to be a little disgusted with her admirer, and kept flying about from point to point. The *Peckius* followed her, however, until an unintentional movement on my part frightened it away.

Speaking of inter-special matings, a person who, though not an entomologist, has observed butterflies a good deal, and helped me not a little, solemnly affirmed that he had seen an *Argynnis Idalia* in coitu with *Phyciodes*, sp. This is "coming it a little too strong."

Pamphila Bimacula, G. and R.—Somewhat common in very wet meadows, in June and July. The ♀'s are apparently much in excess,

contrary to the general rule. It flies with a long, straight flight peculiar to this species, dropping suddenly into the grass, and hard to observe unless flushed, owing to its colour being so like the stubble. Because of its peculiar habits it might, like *Pam. Metea*, pass as a great rarity. It has frequently been observed by me feeding on the flowers of *Arethusa*, a very fragrant orchid growing in wet meadows among the grass, and later in the season on swamp milkweed.

Pamphila Delaware, Edw.—One specimen only. July 10th, 1894. Wet meadow.

Amblyscirtes Vialis, Edw.—Somewhat common. May and June.

Amblyscirtes Samoset, Scud.—Not nearly as common as *Vialis*, and not on the wing so early.

Nisoniades Brizo, Bd.—Lec.—Scarce. Early June.

Nisoniades Icelus, Lint.—Common. May, June. It is very possible, as I have given this species very little study, that there may be another species in company with it. According to Scudder, *Lucilius* should be found here.

Nisoniades Persius, Scud.—Scarce in July and August. Probably a second brood, but as it would be difficult to distinguish from *Icelus* on the wing, the first brood might easily escape notice.

Nisoniades Juvenalis, Fabr.—Somewhat common in June.

Eudamus Pylades, Scud.—Very common in June.

Eudamus Bathyllus, Sm. and Abb.—While looking over a series of native *Pylades* this winter my attention was struck by the appearance of a specimen which Mr. Skinner pronounces to be *Bathyllus*. I remember nothing about the capture of the specimen, and never having looked for the species, or expected to meet with it so far north, I can say nothing as to its habits or numbers.

Eudamus Tityrus, Fabr.—Formerly scarce, but of late years common. The last season it was as common as *Pylades*. I have frequently noticed the female hovering over patches of wild bean (*Phareolus perennis*), but not until last season did I find larvæ on this plant. Out of several such larvæ one *Tityrus* emerged this winter from a forced pupa. I have also seen larvæ on garden beans, which were probably this species.

There are several more species of *Hesperida* which ought to be found in this locality, but the preceding are all that I have met with. If the season of 1896 is a good one, I hope ere it closes to add something to the knowledge of this family.

ON TWO INTERESTING NEW GENERA OF SCALE INSECT PARASITES.

BY L. O. HOWARD, WASHINGTON, D. C.

Nearly all the Chalcidid parasites of Coccidæ belong to the subfamilies Aphelininæ and Encyrtinæ. So universal is this rule that it is remarkable to rear anything else from a Coccid (excluding, of course, hyperparasites)*. One or two Mymarids and the species of the curious subfamily Signiphorinæ live in the eggs of scale insects, and we are just beginning to realize that there is a peculiar group of genera allied to the old subfamily Pireninæ which also have this habit.

The first of these insects to be recognized as a primary scale insect parasite was a species of the genus *Tomocera* described by the writer in 1880 and reared from *Lecanium oleæ* from California. This name in 1885 was changed to *Dilophogaster* on account of the occurrence in Thysanura of a genus *Tomocerus*. In the meantime, however, Cameron had erected for the same form, from specimens received from the Hawaiian Islands, his genus *Moranilla*. According to the present rules of classification, however, *Tomocera* may stand in spite of its identical etymological significance with *Tomocerus*.

Another of these genera was described by Dr. Riley in 1890 as *Ophelosia* from specimens reared from *Icerya purchasi* in Queensland. A third—Walker's genus *Eunotus*—has recently been found by Mr. W. G. Johnson to be parasitic upon *Lecanium* scales in Illinois, as pointed out by the writer in Technical Bulletin No. 1, Division of Entomology, U. S. Department of Agriculture, and a fourth—*Scutellista*, Mots.—has been found by Dr. Berlese to parasitize *Cerooplastes* scales in Italy. This form has been redescribed with synonymical notes by the writer in the "Revista di Patologia Vegetale."

Aside from the matter of tibial armature, these genera seem closely allied and to possess on the whole strong mutual affinities. The shape of the head, its acute occipital margin, the mesonotal characters, the 10-jointed (♀) and 9-jointed (♂) antennæ, the greatly enlarged second segment of the abdomen, together with other characters point to a subfamily not yet recognized in our classification of the Chalcididæ, and the uniform Coccid-feeding habit binds the group still more closely together.

* Representatives of *Pachyneuron*, *Euneura*, and *Hypsicamara* have been reared from Coccidæ, but those of *Pachyneuron* are almost certainly hyperparasites, and the others may be; while the species of *Tetrastichus* quite commonly so reared are undoubtedly secondary.

In view of these facts, the receipt of two additional allied genera, also Coccid-feeders, and undescribed, from Mr. W. Maskell, of New Zealand, becomes a matter of considerable interest.

APHOBETUS, n. g.

Female.—Antennæ 10-jointed, clavate, inserted just above clypeus, scape slender, not reaching to middle ocellus, pedicel long, three times as long as first funicle joint, funicle joints 2 to 5 increasing slightly in length and considerably in width, club ovate, slightly broader than funicle joint 5 and longer than 4 and 5 together. Eyes naked; parapsidal sutures meeting axillar sutures; scutellum broad at base, with a distinct transverse groove at apical third. Petiole broad, distinct, abdomen without the white basal tufts characteristic of *Tomocera*, second segment very long, three times as long as remaining segments together. Marginal vein of fore wings somewhat longer than stigmal, postmarginal evident, but shorter than stigmal; basal nervure distinct. Hind wings broad and furnished with a strong basal vein running nearly at right angles into disc of wing for some little distance at extremity of submarginal. Hind coxæ somewhat swollen, middle tibiæ with a moderate spur, hind tibiæ with a very long spur, a little longer than first tarsal joint.

Male.—Differs mainly in antennæ, which are 9-jointed; scape longer than in the female, pedicel somewhat swollen, joints 1 to 4 of funicle with long hairs, strongly incised from above at extremities and each joint slightly pedicillate; joint 1 longest, twice as long as pedicel, joints 2, 3 and 4 each becoming shorter, club somewhat ovate, with its first joint distinctly separated and as a whole longer than funicle joint 4, but shorter than 3 and 4 together. Body flat, abdomen somewhat elongate, second segment somewhat longer than remaining joints together.

Aphobetus Maskelli, n sp.

Female.—Length, 1.16 mm.; expanse, 2.4 mm.; greatest width of fore wings, .51 mm. General colour blue-black, slightly metallic, glistening. Face with faint shallow, sparse depressions; mesoscutum delicately shagreened, abdomen smooth, shining, hairs of mesonotum black, fimbria of metanotum rather sparse, grayish; pleura shining; antennæ honey-yellow, with pedicel and scape above darker; all coxæ and femora black, the latter yellowish at tip; all tibiæ dark in middle, yellowish at either end; wing veins dark brown, except basal vein of fore wings, which is lighter; fore wings with circular fuscous patch occupying centre of wing.

Male.—Somewhat slenderer than female, but about same length; sculpturing identical, antennæ jet black, legs coloured as with female.

One female, four males, reared by W. M. Maskell, New Zealand, from *Ctenochiton viridis*. This is probably the insect figured by Mr. Maskell on Plate XXIII. of his "Scale Insects of New Zealand," 1887.

ANYSIS, n. g.

Female.—Antennæ as with *Aphobetus*, except that funicle joint 2 is twice as long as 1; 3, 4 and 5 subequal in length, increasing in width, and each slightly shorter than 2. Eyes naked; head very broad; occiput strongly concave, its superior margin acute. Thorax well arched; parapsidal sutures meeting axillar sutures; scutellum broad at base, somewhat lengthened, extending over metanotum to vertical plane of base of abdomen, not cross-furrowed. Petiole distinct but very short; abdomen without basal tufts; second segment scarcely half the length of abdomen. Marginal vein of fore wings three times longer than stigmal, postmarginal about as long as stigmal or slightly shorter; basal nervure not distinct. Basal nervure of hind wings extending at an acute angle toward base of wing. Spur of hind tibia short.

Anysis australiensis, n. sp.

Female.—Length, 1.7 mm.; expanse, 3.8 mm.; greatest width of fore wings, .74 mm. General colour blue-black, slightly metallic, glistening. Head and thorax with short, sparse, yellowish pile; face delicately shagreened and with fine sparse punctures; mesonotum similarly punctured; metanotum, pleura, and abdomen smooth; metanotum with a median longitudinal rounded carina. Antennæ light brown, tip of club darker, pedicel and tip of scape above black; all femora nearly black in middle, lighter at either end; tibiæ brown. Wing veins dark brown, fore wings infuscated, hind wings hyaline.

Three females received from Mr. W. M. Maskell with the following note: "With a very curious new Coccid from West Australia, genus not yet determined; probably allied to *Eriococcus*."

MISS ORMEROD, who was for some years Consulting Entomologist to the Government, her knowledge of the insect world being unapproached by any other living authority, has now received the distinction of being appointed an examiner in this branch of agricultural science at Edinburgh University.—*Illustrated London News*.

CORRESPONDENCE.

THE MUTILLID GENUS CHYPHOTES.

On Aug. 21, 1894, I found at Santa Fé a specimen of *Chyphotes*, which I thought might prove to be a new species, as the legs are brown, with the femora and tibiæ, except their ends, black. The abdomen is also more elongate than in Blake's figures of *C. elevatus*, and the third segment is fuscous. The length of the insect is 9 mm. Mr. Fox, after comparing it with Blake's types, is persuaded that it is only a form of *elevatus*. It follows the rule already observed in certain bees of the genus *Perdita*, that individuals from higher elevations are darker.

The most curious thing developing from the examination of this specimen was, that Blake's account of the palpi of *Chyphotes* is all wrong. My example has the palpi honey-colour, maxillary palpi 6-jointed, lateral palpi 4-jointed. Formula for maxillary palpi 3 (46) (25) 1. Second joint of lateral palpi broadened. When I called Mr. Fox's attention to this, he wrote back that *C. elevatus* was really similar, the description being wrong.

T. D. A. COCKERELL.

PROPOSED BIOLOGICAL STATION.

The undersigned has it in view to found in New Mexico a Biological Station, and health and holiday resort for scientific persons, teachers, and kindred spirits. No loafers would be admitted, nor persons whose health was so poor as to prevent them from working.

Practically no funds are at present available, but it is hoped that if a very modest start is made, the means may in time be found to put the institution on a secure and permanent basis.

In such an establishment, scientific work may be carried on without any fear of interference by politicians and other self-interested or ignorant persons; while the Station might also come to be recognized as an independent educational centre, helping to promote the best interests of education in the broadest sense, as well as those of pure science.

The promoter hopes to be able, sooner or later, to secure the co-operation of a number of persons who will engage in the work for its own sake, and will not object to necessary privations or be afraid of the inevitable difficulties. Without enthusiasm, nothing can be done.

Three years' experience in this country gives the writer the highest opinion of the value of the climate for persons in the earlier stages of

phthisis (as he was himself when he came here); while the abundance of new and interesting forms of life, especially among the insects, is remarkable. Many interesting general problems, such as those of the life-zones, can also be studied in New Mexico to great advantage.

A beginning will be made this summer if students can be found. The undersigned will be glad to hear from any who are interested in the matter, and especially from those who might be inclined to work with him for longer or shorter periods during the present summer.

May 4, 1896.

T. D. A. COCKERELL,
Las Cruces, New Mexico, U. S. A.

A MOTH OUT OF PLACE.

There has been added to the Society's collection a moth of more than ordinary interest. I sent to Prof. J. B. Smith, for determination, a box of specimens which were to me either new or doubtful. He kindly and promptly returned the same with the names of all except one, which was a *Plusia* quite new to him, and retained it for further study. In the letter to me accompanying the names, the Professor remarked: "No. 12 (*Taniocampa vegeta*) is rather a surprise to me from your locality. Of course, it is not a *Taniocampa*, but it has been so described." He then referred me to his catalogue of the Noctuidæ (Bulletin 44, of the U. S. N. M.) for what was known concerning the species. So I turned to it and found this on page 207:

"*T. vegeta*, Morr.

"1875. Morr., Proc. Ac. Nat. Sci., XXVII., 432, *Taniocampa*.

"Habitat.—Texas.

"The type is in the Tepper collection. A correctly named specimen is also in the British Museum, from the Grote collection. The species is not a *Taniocampa*, and probably belongs to the fasciatæ; but in default of sufficient study to place it certainly, I leave it here for the present. Mr. Slingerland has called my attention to the fact that *Cissusa spadix*, of Cramer, heretofore referred as a synonym of *Drasteria erichtea*, is a distinct species. On examination I find this to be the fact, and it is more than likely that it will prove the same as the above species. Material for study is lacking, therefore the reference can not be positively made."

So it yet remains inaccurately placed from want of sufficient material for study. It seems also to have got far away from its supposed proper place of residence. Taken in London, at electric light, about the middle of April, 1896.

J. ALSTON MOFFAT.

BOOK NOTICES.

THE TAXONOMIC VALUE OF THE ANTENNÆ OF LEPIDOPTERA. BY DONALDSON BODINE, TRANS. AMERICAN ENTOMOLOGICAL SOCIETY, XXIII., PP. 1-56, PLATES I-V., 1896.

Mr. Bodine finds good characters in the finer external structure of the antennæ, especially the sculpturing and the distribution of the different types of sensory hairs. Prof. Comstock's suborders are abundantly confirmed. Not only does Mr. Bodine find that the antennæ of *Hepialus* and *Micropteryx* separate them sharply from all the frenatæ, but he considers the jugatæ even more nearly allied to the *Trichoptera* than to the other Lepidoptera. Mr. Bodine does not attempt a rigid classification of the frenatæ on antennal characters which would have been desirable; but draws attention to a number of special affinities. The only one of these which is at all disturbing to the most recent views is that which implies a close relationship between the *Sphingidæ* and *Sesiidæ* (p. 36). In spite of the close similarity in structure of the antennæ, I do not think that this view which derives the *Sphingidæ* from the *Sesiidæ*, and therefore from the Tineids, will obtain. There seem to be too many objections on other grounds. HARRISON G. DYAR.

THE CRAMBIDÆ OF NORTH AMERICA, by C. H. Fernald, A. M., Ph. D., Massachusetts Agricultural College, 1896.

This little book of less than one hundred pages is really an admirable monograph of this family of Grass-moths. In the introduction, the author briefly relates the injury that is often done by these insects to grass crops, and mentions some of the natural enemies that keep them in check. He then gives an historical account of the family in the writings of Entomologists, and after a chapter on the external anatomy, proceeds to give descriptions of the genera and species, including the preparatory stages as far as known. The synoptical tables of genera and species are excellent, and afford a ready means of identifying a specimen when made use of in connection with the clear and concise descriptions and the beautiful illustrations. Besides a few wood-cuts in the text, there are three plates depicting the anatomy and wing venation of the family, and six exquisite coloured plates of the species. We trust that collectors will now be induced to study this family, as the way has been made so easy for them, and then be encouraged to investigate other families of Microlepidoptera.

Mailed June 4th.

The Canadian Entomologist.

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No. 7.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XVII. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC—(Continued).

TRIBE VII.—EUMOLPINI.

A large group, containing numerous genera and species; the North American forms have been recently studied by Dr. Horn, and the following generic table is a condensation, with a few modifications, of the one given by him.

A. Anterior margin of prothorax beneath arcuate, forming post-ocular lobes.

b. Body above pubescent or scaly.

Thorax without distinct lateral margin..... *Adoxus*.

Thorax with distinct lateral margin, size rather large. *Glyptoscelis*.

bb. Body above glabrous.

c. Small species (not above .16 in.) *Typophorus*.

cc. Larger (above .20 in.)

~~Claws~~ simply divergent, legs dark..... *Chrysochus*.

~~Claws~~ divaricate, legs testaceous..... *Tymnes*.

AA. Anterior margin of prothorax beneath straight.

d. Thorax without distinct lateral margin.

Not metallic above; thorax transverse, third antennal joint not longer than the second..... *Xanthonia*.

Metallic green above..... *Graphops*.

dd. Thorax margined.

e. Head with distinct supra-orbital grooves, middle and hind tibiæ emarginate near the apex..... *Metachroma*.

ee. Head without supra-orbital grooves.

f. Lateral margin of prothorax irregular or undulating.

Prosternum narrow, contracted between the coxæ. *Colaspis*.

Prosternum wide, sides nearly parallel.... *Rhabdopterus*.

ff. Lateral margin of prothorax regular and entire; third joint of antennæ distinctly longer than the second, the outer five joints not abruptly wider..... *Nodonota*.

ADOXUS, Kirby.

Represented by *A. obscurus*, Linn., var. *vitis*, Fabr., a broad-shouldered insect about .20 to .25 in. long; the thorax dark brownish or black and much narrower than the yellowish elytra, which are punctate in rows and clothed with a fine whitish pubescence. Legs dark, tibiae paler. The typical *obscurus* has the elytra dark, unicolorous with the thorax.

GLYPTOSCELIS, Lec.

The only record is of *G. pubescens*, Fabr., a rather large (about .35 in.) insect of somewhat parallel form and green-bronze colour, clothed with a pubescence of mixed cinereous and yellowish hairs. The thorax and elytra are confusedly and distinctly punctured; the neighbourhood of the scutellum has a depressed space. Legs more or less reddish.

TYOPHORUS, Er.

T. canellus, Fabr., is one of the most variable of our Chrysomelidæ. It is a small insect, not exceeding .16 in. in length; the thorax narrower than the elytra, which are distinctly punctured in rows. Surface shining. In colour there is such a variation as to have given rise to several varietal names, *aterrima*, Oliv., having been applied to an entirely black form. The name *4-notatus*, Say, belongs to a variety with black thorax and spotted elytra, while *4-guttatus*, Lec., has a yellow or reddish thorax and spotted elytra. Others occur, but not having been recorded from the region under consideration, they are passed by for the present. A full account of them will be found in Dr. Horn's paper.

CHRYSOCHUS, Redt.

A common species on the Dog's-bane (a milk-weed) is *C. auratus*, Fabr., a large green-bronze beetle, about .40 in. long, often with the most brilliant golden reflections. The body is rather more elongate in form than the preceding species and very convex. There is also a record of *C. cobaltinus*, Lec. (properly a Pacific Coast species), which is of blue colour, sometimes with a touch of green.

TYMNES, Chap.

L. tricolor, Fabr., is a rather brilliant beetle, about .25 in. long, metallic green or bronzed in colour, the legs almost always reddish or yellowish, the upper lip pale. Elytra coarsely punctured, acute at apex; "anal segment often pale, especially in the males, in which sex that segment is broadly emarginate and with a transverse depression" (Horn).

XANTHONIA, Baly.

Here belong two Canadian species. They are small beetles with broad elytra and narrower thorax, as in *Adoxus*, the upper surface finely pubescent. Dr. Horn separates them thus :—

Punctures of elytra very confused, with a feeble seriate tendency towards the sides ; elytra usually dull ochreous with piceous spots, but sometimes entirely fulvous. .12 in. *decemnotata*, Say.

Punctures of elytra much finer and arranged in regular series, but slightly confused near the suture ; colour usually pale fulvous, varying through brown or piceous, not spotted.

.12 in. *villosula*, Mels.

With the last species is united *X. Stevensii*, Baly.

GRAPHOPS, Lec.

Small species of more than usually cylindrical form and metallic green or coppery colours. The prothorax is rugose, at least on the sides, and the elytra pubescent with rather large striæ composed of distant punctures. The two species from the region under consideration are :—

Larger (.16 in.). Prothorax punctured, rugose at sides *pubescens*, Mels.

Smaller (.10 in.). Prothorax rugosely punctured over the whole disk *curtipennis*, Mels.

METACHROMA, Lec.

Contains species which resemble in form the well-known *Typophorus*, but with post-ocular lobes. Two are found in Eastern Canada.

Posterior femora simple; thorax densely punctate, somewhat strigose ; usually black, elytra sometimes with a humeral and apical spot (occasionally united along the margin) dull red. Legs pale in Northern specimens. .12-.14 in. *quercatum*, Fabr.

Posterior femora with a small tooth on lower edge about one-third from the knee ; thorax scarcely at all punctate ; colour variable, from entirely pale through forms with black thorax, suture and elytral spots to those completely black excepting the legs. .13-.18 in. *dubiosum*, Say.

COLASPIS, Fabr.

Here belongs *C. brunnea*, Fabr. (*suilla* of the Society's List), a pale brownish or yellowish beetle, of oblong-oval form, the elytra costate, the

spaces between these costæ being occupied by two irregular rows of coarse, deep punctures. It is extremely variable and the varieties have received names as follows: *suilla*, Fabr., is applied to the form in which the head and thorax are brown with slight metallic lustre; *costipennis*, Cr. (*Crotchii*, Lefvr.), to those specimens with brilliantly metallic head and thorax and brown elytra with yellow costæ; while *flavida*, Say,

is the yellowish-testaceous form, merely a little darker beneath.

[Horn.] Length, .16-.24 in. Fig. 17 represents *C. flavida*, natural size and magnified. Fig. 18, the larva, highly magnified.

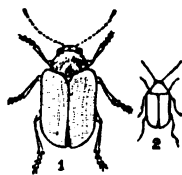


Fig. 17.

RHABDOPTERUS, Lefvr.

The insect formerly known in collections as *Colaspis pratexta*, Say, has been referred to this genus, and Dr. Horn has substituted the older name, *picipes*, Oliv., therefor. It will therefore stand as *Rhabdopterus picipes*, Oliv. It is a rather brilliant bronzed or greenish insect, .16-.20 in. long, of oblong-oval form, very convex above. The antennæ are testaceous with darker tip, under surface of body greenish, abdomen brown, tip paler, legs testaceous. Elytra with coarse, irregular punctures on the disk, apex substriate.

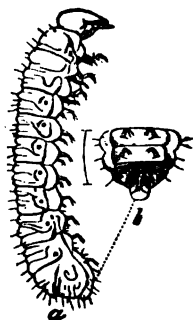


Fig. 18.

NODONOTA, Lefor.

Includes species formerly placed in *Colaspis*. Our species are all rather small insects, of convex form, something like *Colaspis*, but shorter in proportion; in colour more or less metallic, bluish or greenish, legs piceous or testaceous. Dr. Horn separates the three species (formerly recognized only as varieties) found in our region as follows:—

Form short, oval, punctuation of prothorax simple.

Upper surface shining; metasternum not punctate at sides. .11-.15 in. *tristis*, Oliv.

Upper surface dull; metasternum coarsely punctate at sides. .15-.18 in. *convexa*, Say.

Form oblong, subparallel, punctuation of prothorax substrigose; elytra with distinct costa behind the umbone.

.13-.17 in. *puncticollis*, Say.

NOTES ON SOME MOTHS FROM THE COLLECTION OF
MR. A. BOLTER.

BY HARRISON G. DYAR, PH. D., NEW YORK.

Hepialus hyperboreus, Möschler.

This species exhibits a well-marked local variation. Before discussing this I would correct the account in Journal N. Y. Ent. Soc., II., 168, in respect to the synonymy of *confusus*. This form is really the same as *roseicaput*, N. & D., as the description shows. How we were misled into referring the name as a strict synonym, I cannot now recall. It may be well, moreover, to retain a distinct name for the American form until its life-history is known and we can be certain whether it is or is not the same as the European *ganna*.

H. hyperboreus occurs throughout the northern and mountainous parts of North America, from the Atlantic to the Pacific. It is recorded from Labrador [Möschler]; Mt. Washington, N. H. [Mrs. Slosson]; Colorado [Grote]; Calgary, Alberta [Wolley Dod]; Sierras of California [Hy. Edw.]; Vancouver I., B. C. [Bolter]; Cascade Range, B. C. [Neum. & Dyar]; and Alaska [H. Edw.].

The colour of primaries is brown, varying from dark to pinkish or yellowish-brown; the silvery markings are complete in all the specimens from the Rocky Mountains and eastward and south of Oregon. In the Northwest, the silvery marks begin to be distinctly replaced by the blackish shades which form their borders in specimens from Vancouver Island (*Matthewi*). In the Cascades and Alaska the specimens have no silvery marks, but are banded only with smoky blackish. The size of the specimens is variable. The largest that I have seen is Mrs. Slosson's example from Mt. Washington (50 mm.), and the smallest are some of the specimens of *McGlashani* (30 mm.). The usual size is close to 40 mm., ranging larger in the East. From present information, I would arrange the varieties and synonymy thus:—

HEPIALUS HYPERBOREUS (= *ganna* of Europe?).

hyperboreus, Möschler, 1862. Labrador and Mt. Washington; expanse, 40–50 mm.

pulcher, Grote, 1864. Colorado, and Alberta, Canada; expanse, 36–38 mm.

McGlashani, Hy. Edw., 1886. Truckee, California; expanse, 30–39 mm.

intergrade, MATTHEWI.

Matthewi, Hy. Edw., 1874. Vancouver Island, B. C.; expanse, 35-41 mm.

local race, CONFUSUS.

confusus, Hy. Edw., 1884. Alaska; expanse, 44 mm.

roseicaput, Neum. & Dyar, 1893. Cascade Range, B. C.; expanse, 33 mm.

SYNOPSIS:

Yellowish or reddish-brown, full silvery white marks . . . *hyperboreus*.

Reddish-brown, the ground colour irregular or spotted with yellowish; silvery marks more or less replaced by smoky black . . . *Matthewi*.

Pinkish or yellowish-brown, white marks all replaced by smoky black . . . *confusus*.

Alexicles aspersa, Grote.

A fresh specimen from Las Vegas, N. M. (The type is rubbed.)

Thorax thickly haired, dark gray-brown, touched with white at the bases of the anterior wings, along the collar on the sides below the fore wings; eyes posteriorly margined with red. Upper side of all the femora and the tips of the tibiae and the tarsal joints bright red. Abdomen bright red above except at base and a series of dorsal dark brown spots; gray-brown below, the last two segments tipped with whitish. Fore wings rather thin, grayish-brown, with five transverse rows of dark brown spots and a large discal spot, cutting the otherwise white veins. Expanse, 32 mm.

Macrurocampa Dorothea, n. sp. (Fig. 19.)

Primaries ash-gray with a lilac tint, composed of black and gray scales, quite uniform, without any contrasting pale shades. Basal space up to the t. a. line shaded with blackish-gray, filled in uniformly except the extreme base, which is pale, and a distinct longitudinal black line along vein 1 to the t. a. line, bordered on its lower side by an ochreous shade. T. a. line bounding the dark space, geminate, obscure, blackish, outwardly angled on median vein and inwardly in submedian space. Discal spot lunate, black, confined to the cross-vein. Beyond it the faint, narrow, wavy, black t. p. line crosses the wing, paralleled by a fainter median shade



through the discal dot itself and beyond by a row of small venular black dots, the three lines ending on the internal margin in a darker shade of

the ground colour. In the interspace of veins 3-4 and 6-7 basally, a triangular patch of the same ochreous tint as borders the basal longitudinal line below. Subterminally a distinct black band issues from the apex, slightly toothed outwardly on the veins, inwardly on the interspaces, and proceeds to vein 4, where it is interrupted; but reappears at vein 3, curving inward and reaching a little way along submedian fold, where it ends. Terminal field gray, scarcely lighter than the general ground, irrorate with black. Fringe dark, with obscure venular spottings. Abdomen and secondaries smoky gray, secondaries whitish at basal half. Thorax dark iron-gray, black and white hairs intermixed, the head and under side of thorax paler.

Type, one female. Las Vegas, New Mexico; collection of Mr. A. Bolter, Chicago.

The only Southern species which seems to approach this form is *Heterocampa surinamensis*, Möschler.

NOTE ON TRIGONOGENIUS FARCTUS.

BY E. A. SCHWARZ, WASHINGTON, D. C.

Thirty years ago Dr. Leconte described (New Species, Smithsonian Misc. Coll., 167, p. 100) the Ptinid *Trigonogenius farctus* from specimens received from San Francisco, Cal. Most specimens in our cabinets come from the same locality, but I have seen others from Alameda and Los Gatos, Cal. The collectors of the specimens never published anything on its mode of occurrence, and I fail to find in the literature a single record of its habits. Quite recently, however, Dr. James Fletcher, while on a visit to Washington, D. C., showed me two species of Coleoptera found living in red pepper, in Victoria, Br. Col. One is *Tribolium ferrugineum*, a common cosmopolitan Tenebrionid, which has been found before under similar conditions; but the second species proves to be *Trigonogenius farctus*. Several specimens of this were obtained, thus showing that its occurrence in the pepper was not accidental, and I have no doubt that upon further research the earlier stages of the beetle can also be found in the pepper. [Larvæ of all sizes and cocoons with pupæ in them occurred in this consignment of pepper, which was sent to me by Mr. E. A. Carew-Gibson, of Victoria, B. C.—J. F.] Dr. Fletcher informed me that Victoria gets much produce from San Francisco, and we may

thus infer that the infested red pepper came from that place. On this and various other points connected with the economy of this species, Dr. Fletcher will no doubt be able to furnish further information.

Various Ptinid beetles, *e. g.*, *Ptinus fur*, *Sitodrepa panicea*, *Lasioderma serricorne*, are very fond of red pepper, and the occurrence of *Trigonogenius* in this substance is therefore not surprising, but it brings up another point for consideration. All insects which we find in this country living in groceries, drugs, etc., are of foreign origin, or at least do not belong to the Nearctic fauna. The insects native to North America do not seem to be able, or are not inclined, to adopt this mode of life, and thus it may be questioned whether *Trigonogenius farctus* really belongs to our fauna. Its general appearance certainly bespeaks a foreign origin. The genus *Trigonogenius*, as restricted by recent authors, contains only two described species: *T. globulum*, Sol., from Chili, and *T. squalidus*, Boield., from New Grenada*, and upon comparing the original descriptions the identity of our species with *T. globulum* appears to me quite possible. I have, however, not seen Solier's figure, and a comparison with the type is apparently necessary to decide this question.

The mere feeding of these beetles and their larvæ cannot be said to injure the red pepper, which does not lose its pungent quality by passing through the bodies of insects. But should the *Trigonogenius* be very numerous, the presence of the silken pupal cocoons would cause some inconvenience and loss.

While speaking of imported Ptinidæ, I would add that at least two Old World species are most likely to find their way to North America sooner or later. One is *Niptus griseofuscus*, DeGeer (*Ptinus crenatus*, Fabr.), which appears to be a native of Europe, where it commonly occurs in old straw in cellars and stables. The other species is *Niptus hololeucus*, readily known by the appressed golden-yellow pubescence covering the entire body. It is probably a native of Asia Minor, whence it was imported into Great Britain about sixty years ago. It occurs now at many points in Western and Central Europe, not only living in all sorts of spices and drugs, but also proving to be injurious in various ways. It would be a most undesirable addition to our fauna.

*The two species described and figured by Gorham in Biol. Centr. Amer. are certainly not congeneric with *T. globulum*

THE SMALLER BEES OF THE GENUS *ANDRENA* FOUND
IN NEW MEXICO.

BY T. D. A. COCKERELL, MESILLA, NEW MEXICO.

None of the species herein described or listed are as much as 10 mm. long.

r. Marginal cell truncate.

The species of this section are not true *Andrena*, but will form a distinct genus, apparently as near to *Prosapis* as to *Andrena*. Two of the larger species, *A. asclepiadis*, Ckll., and *A. mexicanorum*, Ckll., are congeneric. I have before me also a species from Texas.*

i. Tarsi piceous in female.

Andrena trifoliata, n. sp.—♀. Length nearly 10 mm. Closely similar in all respects to *A. maurula*, but differing in being slightly smaller, the eyes dull slate colour, not at all greenish; the clypeal mark smaller, paler, and more distinctly trilobed; the front more sparsely punctured, with minute punctures between the large ones; the last 6 or 7 joints of the flagellum becoming testaceous; the wings not rufescent, but the apical half slightly smoky; the third submarginal cell more narrowed above, the first recurrent nervure entering the second submarginal cell at the end of its second third; the legs black; the abdomen with the basal white hair-bands on segments 3 and 4 entire; the hairs on venter very few, and whitish. The metathorax and postscutellum are quite black, not at all brownish. The pale, cream-coloured face-mark is shaped something like a vine leaf.

**Andrena maurula*, n. sp.—Female. Length nearly 10 mm. Black, no more pubescent than a *Prosapis*, strongly punctured. Head broader than long, face very broad; eyes rather small, dull olive green; clypeus arcuate below, its upper half, just enclosing the black dots, and extending as a rounded lobe downwards in the median line, pale primrose yellow. A very narrow, sometimes interrupted, pale yellow supra-clypeal transverse mark. Labrum prominent, truncate, with a small longitudinal keel. Clypeus with large but rather sparse punctures, median line impunctate. Front and vertex closely punctured. Antennæ short, dark brown, scape punctured. Thorax somewhat shining, bare except the minutely pubescent hind border of prothorax, lower part of pleura, and lateral angles of metathorax. Median and parapsidal grooves distinct. Mesothorax and scutellum strongly and closely punctured; postscutellum and metathorax slightly brownish, coarsely granular, or so closely punctured as to seem so; metathorax with a deep pit, enclosure not defined, except by an impunctate band at sides, basally very obscurely wrinkled. Tubercles light yellow, tegulae testaceous with a yellow patch. Wings stained with ferruginous, nervures and stigma dark rusty brown, marginal cell truncate. Legs dark brown, the four anterior knees light yellow. Abdomen strongly and closely punctured, segments after the first with more or less distinct lateral basal white hair-bands. Anal fimbria ochreous. Hairs on venter more or less tinged with ochreous.

Habitat.—Texas; three collected by Belfrage, and now in U. S. Nat'l Museum. One bears the number 237.

Habitat.—Albuquerque, N. M.; two, on June 30th, 1895, between the town and the University [Ckll., 3254, 3256].

ii. Tarsi rufous in the ♀; yellowish white in the ♂.

Andrena heteromorpha, n. sp.—♀. Length about 8 mm.; similar in build and general appearance to *A. trifoliata*, but rather more slender. Black, no more pubescent than a *Prosapis*, face-mark and tubercles pale primrose yellow. Head a little broader than long; eyes black; supra-clypeal mark very narrow, as in the other species of the group, forming the base of the clypeal mark, which is trilobed below, much rounder in general outline than that of *trifoliata*, decidedly longer in proportion to its breadth than in that of *maurula*. Mandibles simple, rufous, with the tips blackish and the bases becoming yellow. Face and front shining, strongly but irregularly punctured, vertex strongly and closely punctured. Antennæ black, the flagellum from the 4th joint becoming rufous beneath. Tubercles pale yellow with a black spot near the hind margin. Mesothorax shiny, closely punctured, parapsidal grooves distinct. Scutellum closely punctured. Postscutellum and metathorax coarsely granular, base of metathorax with small, ill-defined longitudinal wrinkles. Tegulae testaceous, with a triangular pale yellow spot; wings smoky hyaline, nervures and stigma dark brown, the former ferruginous at base of wing. First recurrent nervure entering second submarginal cell at the end of its second third. Legs black, first four knees yellow, hind knees ferruginous; tarsi ferruginous, first joint of middle tarsi quite broad. Abdomen strongly and closely punctured, without distinct hair-bands or spots, but the last two segments pruinose with white pubescence. Anal fimbria pale ochreous.

♂. Smaller and more slender, the abdomen subcylindrical. Face wholly pale primrose yellow below level of antennæ, the upper margin of the yellow straight, only notched on each side of the dog-ear marks, and produced narrowly a short distance along the orbits. Basal portion of mandibles externally all pale yellow. Antennæ entirely dark, not at all rufescent. Second submarginal cell very narrow. Anterior tibiæ pale yellow in front; all the tarsi cream colour, except the darkened terminal joint. Abdomen with the last four segments primrose. Punctures of basal segment not so close.

Habitat—Las Cruces, N. M.; close to the Agricultural College, on *Verbesina encelioides*; Sept. 12th, 1895 [Ckll., 5056, ♀; 5058, ♂].

2. Marginal cell pointed.

- i. ♀ with wings tinged yellowish, stigma pale ferruginous, abdomen impunctate; ♂ with clypeus dark; hind tarsi clear ferruginous in both sexes.

Andrena salicinella, Ckll., Psyche Suppt., 1895, p. 4. The type was taken on willow, but was unique, and among many bees collected on willow at the same place, May 2nd and 3rd, 1896, are no *salicinella*. Both sexes were, however, taken in quantity on *Sisymbrium canescens*, on the College Farm, Mesilla Valley, N. M., April 12th and 16th, 1895, the males predominating.

The ♂ differs by the face being covered with dense white pubescence, the flagellum ferruginous beneath; the wings clear, not yellowish; the stigma reddish brown, darker than in the ♀; the abdomen narrower, but distinctly banded. When I published *salicinella*, Miss J. E. Casad had already described the species as new (in MS.) from the ♂, but I was not aware that her insect was the opposite sex of mine.

Miss Casad has described (in MS.) another species from a ♂ taken on *Krynitzkia* (supposed to be *K. Jamesii*), on Little Mountain, Mesilla Valley, April 1st, 1895. This is smaller than ♂ *salicinella*, and the head seems very much broader in proportion to its length; but the latter feature is probably due, at least for the most part, to the retraction of the mouthparts and the absence of the dense white clypeal pubescence, except at the sides. My present opinion is that it is probably an individual mutation of *salicinella*, but it may be a distinct but closely allied species.

- ii. Wings not tinged yellowish, hind tarsi not clear ferruginous.

- a. Clypeus dark in the ♂, abdomen tessellate but impunctate.

Andrena monilicornis, n. sp.—♂. Length about $8\frac{1}{2}$ mm. Black, with long dull white pubescence. Head broader than long, face densely covered with long white hairs, cheeks less densely; vertex bare, flattened or even slightly concave, microscopically reticulate, and with large, rather sparse punctures. Antennæ long, wholly black, the joints somewhat swollen, moniliform, first joint of flagellum not longer than the third. Mandibles wholly black. Thorax covered with long hairs; the prothorax, disk of mesothorax, scutellum, and enclosure of metathorax, bare. Mesothorax rather dull, with large, rather sparse punctures. Scutellum shiny, with sparse punctures; a small impunctate space on each side of the middle. Enclosure of metathorax dull, minutely roughened, bounded only by an impressed line. Tegulæ shining dark brown. Wings hyaline, iridescent, nervures and stigma testaceous, costal nervure black. Second

submarginal cell very broad, receiving the first recurrent nervure at its middle. Legs black, apical joints of tarsi becoming dull ferruginous. Femora with very long white hairs. Abdomen moderately broad, having a silky lustre, strongly minutely tessellate, impunctate. All the segments sparsely hairy, their hind margins with thin white hair-bands, failing in the middle. Venter with continuous white hair-bands. Apex with white hairs.

Habitat.—College Farm, Mesilla Valley, N. M.; on plum; March 25th, 1896.

b. Clypeus pale primrose yellow in the ♂, abdomen punctate.

(1) Larger, distance between the clypeal dots in ♂ not greater than distance from one to top of clypeus.

Andrena capricornis, Casad and Ckll, n. sp.—♂. Length, 8 mm.; stoutly built; black, with dull white pubescence; clypeus and a large mark on each side of it very pale primrose yellow. Head broader than long, face and front with rather long but thin pubescence; clypeus large, unusually high, almost bare, with scattered punctures; there are either two minute gray dots or there may be two gray bands, extending upward and laterad from the position of the dots, meeting each other at a right angle. The lateral face-marks are irregularly diamond-shaped, the upper outer margin notched. Vertex roughened, a polished, sparsely punctured area at the summit of each eye. Antennæ fairly long, black, the tip of the flagellum beneath becoming dark coffee-colour. First joint of flagellum about as long as second and third together, second not as long as broad. Mandibles wholly black; lower margin of clypeus black, arcuate; basal process of labrum emarginate. Thorax quite densely pubescent; mesothorax dull, rather closely punctured; scutellum shiny, irregularly punctured; enclosure of metathorax granular, bounded only by an impressed line. Tegulae dark chestnut brown, wings hyaline, nervures and stigma dark reddish brown, costal nervure black; second submarginal cell narrowed above, receiving the first recurrent nervure just before its middle. Legs black, pubescent, apical joints of tarsi becoming more or less rufescent. Abdomen rather broad and short, punctured, only moderately shiny, clothed all over with thin white pubescence, which forms ill-defined bands, interrupted in the middle, on the hind margins of the segments. When the insect is viewed from the side the bands on segments 2 to 4 look very white and distinct, as, indeed, do those on 2 and 3, viewed from above.

Habitat. — One on plum, College Farm, Mesilla Valley, N. M., April 9th, 1895 [Casad, 161]; another on plum, same locality, March 25th, 1896 [Ckll.].

- (2) Smaller, distance between the clypeal dots in ♂ much greater than distance from one to top of clypeus.

Andrena primulifrons, Casad, n. sp. — ♂. "Black, pubescence ashy, head broader than thorax; clypeus and lateral spots somewhat triangular in shape, their longest side toward clypeus and extending a little above it on sides of face, pale lemon yellow; clypeus broader than long, with black dots about half way between upper and lower edge and separated from each other by about the length of the clypeus; rest of head black, face clothed with ashy hairs and fringed at its base, vertex bare, occiput and cheeks clothed with long hair; antennæ testaceous beneath; thorax clothed same as head, hairs longest on pleura, very sparse on metathorax; wings hyaline, iridescent, nervures piceous; legs with hairs, sparsest and longest on femora; abdomen sparsely clothed with short hairs; segments banded apically. Length about 6 mm. Its general appearance is much like that of *Halictus fasciatus*." [Jessie E. Casad.]

♀. "Black, having an oily appearance, pubescence grayish, mixed with ochraceous; head very little broader than thorax, face as long as broad, clothed sparsely with short pale ochraceous hairs, those on clypeus very scattered; antennæ pale brown from fourth joint to tip beneath; thorax clothed similarly to head, metathorax bare, punctured and fringed marginally; wings hyaline, third submarginal cell long, narrowed more than one-half toward marginal, stigma fulvous, tegulæ testaceous; legs dark brownish, clothed with pale hairs, heaviest on tibiae and tarsi; last joints of tarsi reddish; abdomen punctured, clothed with fine, short, scattered hairs; apical marginal bands interrupted on segments one and two; bands entire on following segments." [Jessie E. Casad.]

Habitat. — Mesilla Valley, N. M.; Little Mountain, April 1st, 1895, on *Krynitzkia* (supposed to be *K. Jamesii*), a ♀ [Casad, 154]; Campus of Agricultural College, on flowers of *Biscutella Wislizenii*, April 9th, 1896, a ♀ [Ckll.]; on plum, College Farm, April 10th, 1895, a ♂ [Casad, 187]; on plum, College Farm, March 25th, 1896, a ♂ [Ckll.]; on *Sisymbrium canescens*, College Farm, April 16th, 1895 [Ckll., 2790, 2742].

Miss Casad had described the sexes as distinct species, but they are doubtless one. The stigma varies in colour, being sometimes reddish

fulvous, sometimes brown; but its margin is always conspicuously darkened below. The enclosure of the metathorax is strongly granular, contrasting with a comparatively shining area on each side of it. The nervures in the ♀ are distinctly darker than in *salicinella*.

P. S.—June 2nd, 1896. After renewed study, and an examination of the tongue and palpi, I am satisfied that the supposed species of *Andrena* described by me with the marginal cell truncate represents a valid new genus, which I will call *Protandrena*. The species are as follows: *P. asclepiadis*, *P. mexicanorum*, *P. trifoliata*, *P. maurula*, *P. heteromorpha*.

LEPYRUS ALTERNANS AND CAPUCINUS, LIXUS FOSSUS, CREMASTOCHILUS HARRISII AND POLYPLEURUS NITIDUS.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

Lepyryus alternans, Casey.—In a former paper (p. 125) the form described under this name was united with *Capucinus*, Schall, owing to an error of observation in regard to the wings. The example then examined was somewhat broken and it is now evident the wings had been removed. A recent dissection of a perfect specimen exhibits a well-developed pair of wings. This form is closely related to *palustris* (perhaps not more than a geographical variety), differing in the form of the thorax, which, instead of being conical, is much wider at middle than at base (subangulate); the rostrum is perhaps stouter and the mesosternum less elevated—both characters somewhat opinionative; there is no femoral tooth in any of the examples seen; the elytral intervals are less regular, either not obviously unequal or the first and third wider, the others narrower and some of them longitudinally sulcate along the middle; the strial punctuation is usually finer and closer, and the striæ seem to be acutely impressed when the elytra are perfectly denuded. In vestiture ornamentation and other characters the two forms seem identical.

All the examples seen have been from Maine and New Hampshire (Mount Washington and vicinity).

L. capucinus, Schall.—The removal of *alternans* from synonymy with this species necessitates a little change in the former description, where some of the characters peculiar to the latter form were introduced:—

Apterous, black, robust, vestiture nearly uniform. Rostrum stout, longer than the thorax, sulcate on each side of the carina which attains the frontal fovea, rather closely and not coarsely punctured, and with the head thinly clothed with squamoid hairs; scape of antennæ short, not attaining the eye; first joint of funicle stout, second thinner and

two-thirds longer, ferruginous to piceous. Thorax transverse, wider than long, sides nearly parallel to apical third, then rapidly rounding to apical constriction; apex one-fourth narrower than base, subconvex, surface even, closely covered with granuloid tuberculations, smaller on the disk, larger and rugous on the sides; median carina fine, mostly attaining the base. Elytra oval, striato-punctate, striae when denuded slightly acutely impressed, intervals not obviously unequal, granuloid tubercles fine and sparse; apices conjointly rounded, notch very slight. Anterior femora with the sinuation for the tibiae strongly rectangularly laminate and usually the middle and posterior; mesosternum elevated between the coxae. The vestiture is very uniform, mostly of white and gray fine hairlike scales tessellated on the elytra, sparser below; the median spot on the elytra usually seen in the other species is absent, but there is a white one on each apical protuberance; the femora are not annulated and the abdominal spots are wanting. The American examples seen are from Michigan; the European, from Hungary.

L. gemellus, Kirby.—This elegant species was taken by Mr. F. C. Bowditch, in the Rocky Mountains near Eagle Pass, at an elevation of 13,000 feet or over, examples of which, through his courtesy, I have been enabled to see. From these the recorded distribution is Vancouver Island; Alaska (the Peninsula of Kenai and the adjoining Continent, also the Yukon); the Hudson Bay region to Lat. 65°. In the former notice, p. 126, the word "scalerous" should read scabrous.

Lepyrrus palustris.—Examples from Indiana in the cabinet of F. H. Snow, Chancellor of the University of Kansas, are absolutely identical with the cylindrical, long-beaked European form usually sent to America.

Lixus fossus, Lec., 1876, Proc. Am. Phil. Soc., XV., 417; *luculentus*, Casey, Ann. N. Y. Acad. Sci., VI., 209.

Fossus was described from a unique taken at Enterprise, Florida; *luculentus* from examples taken at Lake Worth, Florida, about 250 miles southward. Except in size, the individuals of this species are little variable, but enough so to make two or three species of by any one inclined in that direction. Mr. Casey's types seemingly differ from Dr. Leconte's in three or four points which more ample material shows to possess only individual value. The material in my collection, ♂ and ♀, is from near Jacksonville and from Lake Worth, the latter due to the munificence of Mrs. Slosson, who recently sent me nine examples. The ♂ examples from Jacksonville agree with Dr. Leconte's description of the thorax and basal fovea, the ♀ with his description of the supposed ♀ which is the ♀ of Mr. Casey's *luculentus*. In the males of the examples from Lake Worth the thorax and basal foveæ are diverse, some as in *fossus*, some as in *luculentus*, and others intermediate. The characters drawn from the beak are likewise mutually intermixed.

The following description drawn from 10 male examples illustrates

the principal characters of the species, with the most noteworthy differences observed among individuals:—

Beak about as long as the thorax, sometimes longer, mostly shorter; a broad transverse impression between the eyes more or less evident; a round frontal fovea, a smaller elongate one between the insertion of the antennæ sometimes obsolescent; in some examples a trace of a carina between the foveæ, but usually not; punctuation fine and sparse to coarser and denser, clothed with minute whitish scales to tip; antennæ inserted about one-third from apex, slender, light to dark ferruginous; club mostly darker; thorax about as long as wide, sometimes longer, sometimes shorter, conical; process of base prolonged more or less acutely between the elytra in place of the scutellum, which is not visible; fossa deep, sometimes limited at basal third, sometimes the impression extends to middle and sometimes narrowly to apical margin, densely rugoso-punctulate; some fine punctures, mostly on the sides; elytra not or but little wider than the thorax, with irregular series of moderately coarse punctures, of which the inner three are usually well defined; tips separately acutely rounded and conjointly emarginate; uniformly mottled with condensed spots of short white scaly pubescence, as is likewise the thorax and under side, the latter also ornamented with numerous denuded black dots; femora annulate with white.

Length, .30-.40 inch. Habitat.—Common from Jacksonville, Fla., southward.

The denuded elytral area mentioned by Mr. Casey is entirely due to abrasion, as is also that of the disk of the thorax, neither being present in recent specimens. The surface in some of the examples is covered with a yellow pollenoid powder such as is seen in *concausus*. The female seemingly differs from the male only in the more cylindrical, slightly longer, less pubescent, and more finely punctulate beak, with the antennæ inserted near the middle, and the usually longer thoracic impression.

Cremastochilus Harrisii, Kirby.—This species was taken, by myself, with ants (species not observed) in Western Pennsylvania [CAN. ENT., XX., 160]; also in Florida, with a large ant inhabiting under a board [Ib., XXVI., 255], which Prof. Schmitt names *Camponotus floridanus*. In March, 1895, I took an example with the same species of ant at Lake Worth, under circumstances somewhat different from the ordinary. A small pine had been broken off by a wind-storm about six feet from the ground, the broken end resting on the stump; under the loosening bark of the tree a colony of ants had formed a nest, and in it was this *Cremastochilus*; the ants were in great consternation at the exposure of their habitation, and while anxious and in much hurry to remove their pupæ to places of safety, they appeared to be equally solicitous about the *Cremastochilus*, several of them laying hold of it and dragging it with them. At first it simulated death, but after having been dragged awhile it got up and walked off quite lively under their guidance.

Polypleurus nitidus, Lec.—This fine beetle, rather rare in collections, is abundant along Lake Worth, Florida, in pine hummocks where there are stumps. The larva when full-grown is about an inch and one-half in

length, cylindrical but a little flattened, about one-eighth of an inch in diameter; the body is hard, solid, and not easily crushed; the mandibles large, sharp, and powerful enough to draw blood; the colour is pale yellow with the head piceous. It is very active. The beetle breeds in pine stumps which have been cut two or three years and have dried out; the larvæ devour the solid wood always in a vertical direction, two or three dozen of them being frequently found in a stump six or eight inches in diameter, the inside of which is mostly reduced to powder by the time they are ready to pupate. I took the beetle from February to May, and it may possibly disclose at all times during the year.

This species is probably not confined to pine, as I took it frequently quite remote from any pine, under boards, bark, etc., and I strongly suspect that it breeds in roots, etc., after the manner of some of the Elaterid larvæ called "wireworms."

TWO NEW HESPERIDS.

BY HENRY SKINNER, PROF. ENT., ACAD. NAT. SCI., PHILADELPHIA.

Pamphila Howardi, n. sp.

Male.—Expands 1.50 inches. *Upper side*: Superiors tawny with a fuscous border a little more than one-eighth inch in width; there are from one to four small subapical tawny spots in the fuscous border; at end of cell a dark spot which may or may not be connected with the stigma; stigma rather more than an eighth inch in length, very narrow and unbroken, and extending to inner margin. Inferiors have the same fuscous border and tawny central area. *Under side*: Superiors with tawny central area and border same as upper side; there is a large triangular spot extending into the wing from the base. The tawny colour above this spot is of a darker hue than that below and outside of it. Inferiors very light brown, generally with four or five very faint tawny spots in the central area.

The females are larger, without the stigma and have the under side of inferiors immaculate. Described from eight specimens in my own collection and four in that of the U. S. National Museum, through the courtesy of Prof. L. O. Howard. They are all from Florida; two being from Georgiana, on the Indian River; exact locality of others unknown. This species has usually been confounded with *viator*, but is really nothing like it. The species belongs to the *arpa*, *palatka*, *Aaroni*, *viator* group. It

is a much larger species than *Aaroni*; it has not the bright immaculate inferiors below like *arpa* and differs from *palatka* in the stigma, which in that species is in two short sections. The superiors in *viator* above are fuscous, covered with tawny spots.

Pamphila stigma, n. sp.

Male.—Expands $1\frac{1}{4}$ inches. *Upper side*: Superiors bright yellow; border fuscous, about one-sixteenth of an inch in width; the fuscous extending slightly inwards into the yellow between the veins. Stigma broad, black, and semicircular; very wide in proportion to its length; extending from stigma toward tip of wing is a rectangular fuscous spot. Inferiors fuscous with an orange central area which is broken into four or five spots by the nerves. *Under side*: Superiors yellow with the usual fuscous patch at base; there are five fuscous spots on the outer third of wing, which begin at the inner margin and extend upward, each one being smaller than the other as they extend toward the outer third of the centre. Inferiors bright yellow, a few small fuscous spots scattered about the wings. From several specimens in the collection of the author and Dr. Herman Strecker, of Reading, Pa., from southern border of New Mexico and S.-W. Texas. This species somewhat resembles *brettus* and *phylaus*, but can be known at once by the stigma, which is like that of *campestris*.

ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

The Association of Economic Entomologists will hold its eighth annual meeting in the Library Building, Buffalo, N. Y., on Friday and Saturday, August 21st and 22nd, 1896. The first general session of the American Association for the Advancement of Science will be held on Monday, August 24th, 1896.

It is earnestly requested that members of the Association of Economic Entomologists should promptly inform the Secretary whether they expect to be present or not, and also submit immediately the titles of communications they desire to present, to enable the distribution before the date of the meeting of a preliminary programme.

Full information relating to railroad rates, hotels, etc., is given in the preliminary bulletin of the American Association for the Advancement of Science, a copy of which may be obtained by addressing the local Secretary, Mr. Eben P. Dorr, care of Society of Natural Science, Buffalo, N. Y.

C. L. MARLATT, Secretary.

U. S. Department of Agriculture, Washington, D. C.

BOOK NOTICE.

MONOGRAPH OF THE BOMBYCINE MOTHS OF AMERICA NORTH OF MEXICO, including their transformations and origin of the larval markings and armature. Part I., family 1, Notodontidæ. By ALPHEUS S. PACKARD. National Academy of Sciences, Vol. VII., 1895 (received May 11th, 1896); 292 pages, 49 plates, and 10 maps.

Dr. Packard's long-promised monograph has at length appeared. The copious text is divided into ten sections: I., Introduction; II., Hints on the mode of evolution of the bristles, spines and tubercles of Notodontian and other caterpillars; III., On certain points in the external anatomy of Bombycine larvæ; IV., On the incongruence between the larval and adult characters of Notodontians; V., Inheritance of characters acquired during the lifetime of Lepidopterous larvæ; VI., Geographical distribution of the American Notodontidæ; VII., Phylogeny of the Lepidoptera; VIII., Attempt at a new classification of the Lepidoptera; IX., A rational nomenclature of the veins of the wings of insects, especially of the Lepidoptera; X., Systematic revision of the Notodontidæ, with special reference to their transformations.

Most of these have previously appeared as separate articles, as the reader will recall. The life-histories are given as fully as our present knowledge will allow, much of this knowledge being due to Dr. Packard's own labours. The plates illustrating them are beautifully coloured, the early stages highly magnified. These plates must be seen to be appreciated.

A few remarks in criticism of the memoir will not be understood to imply a lack of appreciation of its many valuable features. In general the synoptic tables of subfamilies, genera, and species are poor and uncritical. They are no improvement over those of the author's monograph of Geometridæ, to which the same criticism applies. In all the figures of larvæ the setæ are imperfectly shown, and their number and position are not to be relied upon. I corrected for Dr. Packard a number of the plates in this respect, but the corrections were necessarily made from memory and on general principles, and there is not a figure which has the authority of a careful copy from nature. Even the special figures in the text are often very erroneous; *e. g.*, figure 9, on page 63, where the back and side views of the same larva are shown as different. Dr. Packard also fails generally to describe the arrangement of the setæ in the text.

The classification of the Lepidoptera which is used is original with the author. It has been already presented in the *American Naturalist*, where I have had occasion to notice it. In rejecting the classification of Prof. Comstock, the author argues that the frenulum is of small value in classification, because both frenulum and jugum are present in some Jugatae, and the frenulum is absent in some Frenatae. While we may admit this argument for what it is worth, it seems that Dr. Packard entirely misses the great cumulative force of the evidence adduced by Prof. Comstock and others for these suborders. Classifications founded on the venation alone [Hampson], the wing scales [Kellogg], and the antennae [Bodine] give the same suborders. I have also shown that the larval characters do not support Dr. Packard's view. But Dr. Packard gives no weight to larval characters, in spite of the implication in the title.

HARRISON G. DYAR.

NOTES.

COLIAS CÆSONIA.—Messrs. C. T. Hills and C. H. Tyris captured no less than fifteen specimens of this Southern butterfly (Fig. 20) on the 11th of June, besides worn specimens that they let go. "They were flying quite abundantly, mostly in a south-easterly direction, crossing the Humber River near Toronto, where the Canadian Pacific Railway bridge is." One specimen was also taken by them on June 14, near Little York. This butterfly has only once before been recorded from Ontario, having been taken on Long Point, Lake Erie.



Fig. 20.

PAPILIO AJAX.—At the end of May, and again on the 18th of June, a single specimen of this butterfly was seen at Port Hope, Ont. It has never before been observed so far east in this Province. In Toronto four specimens have been seen by Mr. C. T. Hills during the month of June this year.

Mailed July 6th.

The Canadian Entomologist.

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No. 8.

NEW BEES OF THE GENERA XENOGLOSSA AND PODALIRIUS (ANTHOPHORA).

BY T. D. A. COCKERELL, MESILLA, NEW MEXICO.

Xenoglossa patricia, n. sp.—♂. Length about 22 mm., very stoutly built; head and thorax black, densely covered with short fulvous pubescence; abdomen and legs bright chestnut red. Head broad, eyes black, orbits somewhat converging above, ocelli very large, a linear groove descending from middle ocellus, vertex obscurely tessellate; clypeus broad, yellow, its upper margin suffused with orange, and its anterior margin narrowly rufous; surface of clypeus rough so as to look like the skin of a lemon; labrum yellow, with appressed, very short, pale fulvous pubescence; mandibles long, simple, with a large yellow patch near the base, suffused outwardly into a reddish tongue, which gradually loses itself in the black of the tips. Antennæ hardly reaching beyond tegulæ, piceous, with the scape, funicle, and first and last joints of flagellum, rufescent. First joint of flagellum longer than the two following, but not so long as the three following. Sculpture of thorax cannot be seen for the pubescence. Tegulæ reddish-testaceous. Wings smoky, nervures piceous, venation as in *X. fulva*. Legs with appressed orange-rufous pubescence, spurs rufous, claws black at ends, strongly bifid, spur of anterior tibia with a broad hyaline wing, as is also the case with *X. fulva*. Abdomen moderately shining, with small, close punctures; first segment with fulvous pubescence at base, the rest bare, but for the fine reddish-fulvous pile, conspicuous when the abdomen is viewed from the side. Ventral segments fringed with reddish-fulvous hairs. Apex produced, black at the broadly truncate end; the apex is more produced and much narrower than in *X. fulva*. Sixth segment with a broad blunt tooth on each side.

Habitat.—Mesilla, New Mexico. At about a quarter to nine on the morning of June 21, 1896, the day being very hot and rather cloudy, I opened, in the town of Mesilla, a number of flowers of *Cucurbita perennis*. The flowers contained great numbers of *Diabrotica 12-*

punctata, but, in addition, each fresh flower contained a single bee. On sorting out the bees after returning home, I was astonished to find they were all of the genus *Xenoglossa*, and included three species, viz.: *X. pruinosa*, Say, 4 ♂; *X. patricia*, n. sp., 1 ♂; *X. cucurbitarum*, n. sp., 3 ♂. *X. patricia* is nearest to *X. fulva*, but it is larger and stouter, and the head and thorax are black. It has no resemblance to any of the other species. Smith's *Melissodes rubricata*, from Oajaca, Mexico, is coloured much like *X. patricia*; may it perhaps be a *Xenoglossa*? It differs from *patricia* by the black pubescence on the legs, etc.

Xenoglossa cucurbitarum, n. sp.—♂. Length about 20 mm.; not so stout as *X. patricia*; black, thorax covered with short orange-fulvous pubescence, legs bright chestnut-red. Head broad, orbits nearly parallel, eyes black; face, cheeks and occiput with rather thin pubescence, long and fulvous on occiput, becoming whitish on cheeks and lower part of face. Vertex more or less punctured, the punctures running into linear grooves on the front. A shining channel descending from middle ocellus. Clypeus closely punctured, lemon-yellow, with its whole upper margin and extreme sides rather broadly black, anterior edge rufous, simple. Labrum yellow, with pubescence as in *patricia*. Mandibles with a large yellow patch, the outer end of which becomes rufous. There is a large, short tooth on the inner side of the mandibles, not far from the base;—this is wanting in *patricia*. Antennæ reaching only to tegulæ, piceous, scape and flagellum dark rufous; first joint of flagellum a little longer than the two following together. Tegulæ reddish-testaceous. Wings smoky, nervures piceous, venation as in *patricia*. Legs with short reddish-fulvous pubescence, spurs rufous, claws black at ends, strongly bifid. Abdomen black, shining, punctured, base of first segment with fulvous hairs; second segment at sides, and the other segments all over, more or less covered with very short, appressed, fulvous pile. Apex produced and truncate, much as in *patricia*. Sixth segment with a tooth on each side.

Habitat.—Mesilla, N. M., as described above.

The following table will serve to separate the species of *Xenoglossa* :—

Legs, except the tarsi, black.

Flagellum ferruginous or testaceous, at least beneath; ♂ with a transverse yellow band on clypeus... *ipomæa*, Rob.

Flagellum black, or nearly so; ♂ with a yellow spot on clypeus, sometimes wanting; ♂ with first joint of flagellum very short... *pruinosa*, Say.

Legs wholly rufous, or fulvous; ♂ with first joint of flagellum long.

Head and thorax fulvous.....*fulva*, Smith.

Head and thorax black.

Abdomen chestnut-red.....*patricia*, Ckll.

Abdomen black.....*cucurbitarum*, Ckll.

X. pruinosa, I have from Pennsylvania and New York; thence to Mesilla is a wide range. *X. fulva* ranges from Lower California to Arizona and southward to Puebla, Mexico; its range seems not to touch that of *pruinosa*. *X. ipomæa* is only known from Carlinville, Illinois, where Mr. Robertson found it and *X. pruinosa* visiting *Ipomæa pandurata*.

The above was written June 21. On June 22, at about 7:45 a. m., the flowers of *C. perennis* were open, and about twenty minutes collecting yielded: *X. pruinosa*, 5 ♂; *X. patricia*, 2 ♂, 1 ♀; *X. cucurbitarum*, 4 ♂, 4 ♀. The honey bees were also visiting the flowers, but seemed disconcerted to find fat *Xenoglossæ* at the bottom of them. In one flower was found an *Agapostemon texanus*, which, it may be remarked, is not so blue with us as Cresson's Texan types, though otherwise agreeing.

The females of *X. patricia* and *X. cucurbitarum* resemble the males in size and appearance; the scopa of the hind legs is fairly abundant, but loose; it is distinctly plumose. In both, the rufous hind tibiæ, on the outer surface, exhibit many small black spots. The legs of *cucurbitarum* ♀ are suffused with black at the base, to a variable extent. In *patricia* ♀ the clypeus and labrum are rufous, the mandibles are rufous without at base, and present a reddish-orange streak on the distal half, this being separated from the rufous by black. In *cucurbitarum* ♀ the clypeus is black, with sometimes an obscure reddish or yellowish spot near the anterior edge, its outline not clearly defined; the labrum also is black, reddish at its upper median border; the mandibles have an obscure yellow spot near the base, and sometimes a streak as in *patricia*. The hairs surrounding the pygidium in both species are bright orange-fulvous.

Podalirius cleomis, n. sp.—♂. Length, 12 mm., stout, black. Head broad, with long but not very dense pubescence, gray and black mixed, hairs on cheeks beneath long and white. Clypeus (except broad black lateral borders), a narrow supraclypeal band interrupted in middle, triangular lateral face-marks, labrum (except a black boss on each side next to upper margin), and a large patch on outside of mandibles, pure white.

When the face is viewed somewhat from below, it is seen that the anterior margins of both clypeus and labrum (which has a small notch) are black. Antennæ black, the scape white in front. The lateral face-marks are divided above by a broad rounded notch into a linear portion extending a little way along the orbital margin, and a broad rounded portion adjacent to the clypeus. Clypeus and labrum punctured, disc of labrum somewhat confluent punctured. Sides of vertex with very small, close punctures; large, scattered punctures behind the ocelli, which are pale honey colour. Thorax densely covered with mixed gray and black pubescence, the sides with little black. Tegulæ black. Wings rather short, hyaline tinged with smoky, nervures and stigma piceous. Legs black, the joints of the tarsi after the first dark ferruginous. First four femora fringed behind with long white hairs. Middle tarsi simple. Hind tibiæ stout, with a long, obliquely-placed spine a short distance from the end. The hind femora are also quite stout, but not so stout as the tibiæ. First joint of hind tarsi broadened, with a conspicuous erect tooth not far from the base. Hind tibiæ with short grayish pubescence, appearing white in some lights. Inner surface of first joint of hind tarsi with short orange-rufous pubescence. Abdomen short and broad, first segment with sparse long grayish hairs, the remaining segments almost nude, the margins of segments 1-6 broadly cream colour or pale yellowish—this colour sharply defined from the black. Apex with two short, widely-separated spines, and short rufescent hairs.

Habitat.—Santa Fé, N. M., August, on *Cleome serrulata*. (Ckll., 1767.) This species is interesting as representing apparently a northward extension of a neotropical type. It resembles the *P. marginatus* (Smith), which Cresson says is found at Orizaba, Mexico; and still more the Mexican *P. tarsatus* (Sichel MS., Dours), from which it differs in the lack of fulvous pubescence, and the white instead of yellow face-marks. Dours says the basal joint of the hind tarsus of *tarsatus* has two spines; in *cleomis* the tibial spur crosses the tarsal spine and, projecting beyond, looks like a second spine. Could Dours have been misled by such an appearance? Dalla Torre, it may be remarked, has proposed to change the name *tarsatus* to *Doursii*, because of preoccupation; but the change is not needed if *Habropoda* be held valid, the other *tarsatus* being of that genus.

Among the U. S. species, *cleomis* resembles *P. californicus* (Cr.) and *P. texanus* (Cr.). From the former it is distinguished by the large

admixture of black in the pubescence, and from the latter by the colour of the pubescence and the black tegulæ. Cresson describes only the ♀ of *texanus*.

Besides the type specimen of *cleomis*, I have two others taken at Santa Fé, in August, by V. Boyle. It may be added that *P. cleomis* shows a considerable superficial resemblance to the European *P. albigenus*, Lep., which I have from Marseilles [E. André], but in *albigenus* the abdominal bands are due to pubescence, as in *alamosanus*.

Podalirius alamosanus, n. sp.—♀. Length about 14 mm.; anterior wing, 9 mm.; stout, black, with cinereous pubescence. Head broad, densely pubescent, except on lower part of clypeus and sides of vertex, which are bare; the pubescence cinereous, becoming tinged with ochraceous and mixed with black on occiput and middle of vertex. Face wholly black. Vertex roughened, and with sparse, indistinct punctures; clypeus rough from dense confluent punctures. First joint of flagellum as long as the second, third and fourth together, second shorter than third. Thorax densely covered with ashy pubescence, becoming dull white beneath, tinged with ochreous and mixed with black (especially on scutellum) on dorsum. Tegulæ fuscous, hairy on anterior half. Wings smoky-hyaline, nervures and stigma piceous, venation normal. Legs black with cinereous pubescence, apical joints of tarsi rufous. Hind tibiæ with short black hairs on inner surface; basal joint of hind tarsi with dark chocolate or fuscous pubescence on inner surface, and a black brush at tip. Abdomen black, the exposed parts with obscure sparse black pubescence; the whole of the first segment, and broad apical margins of segments 2 to 4, covered with very pale ochraceous hairs. Fifth segment with black pubescence, and a patch of pale ochraceous hairs on each side. Ends of ventral segments with pale hairs.

Habitat.—Cañada Alamosa, New Mexico, June 18 [C. H. T. Townsend]. The light abdominal hair-bands are very conspicuous and nearly uniform in width. This species seems to be quite closely allied to *P. mexicanus* (Sichel MS., Dours), but that is larger (17 mm.) and has the pubescence fulvous. Unfortunately, Dours's short description of *mexicanus* contains no reference to the hind tarsi, 5th abdominal segment, etc. The locality of *mexicanus* is vaguely given as Mexico, but the types came from de Saussure, and were probably collected by him on the tableland.

Podalirus vallorum, n. sp.—♂. Length, 12 mm.; anterior wing, 8 mm.; fairly stout, black, head and thorax with dense pale fulvous

pubescence, becoming white on cheeks beneath and lower part of pleura; a very few black hairs on dorsum of thorax. Head broad; vertex shiny, somewhat roughened, sparsely punctured; clypeus rather sparsely punctured. Clypeus (except the narrow anterior margin and a sutural mark on each side above), a supraclypeal band, lateral face-marks, labrum (except the usual pair of spots), a large patch on mandibles, and the scape in front, all lemon-yellow. First joint of flagellum longer than second, and a little longer than third, but not so long as $2 + 3$. Antennæ reaching a little beyond tegulæ. Tegulæ reddish-testaceous. Wings perfectly hyaline, nervures piceous. Second submarginal cell narrowed fully one-half above. Legs black, claws ferruginous at base. First four femora with long white hairs behind, hind femora with shorter black hairs. All the tibiæ with appressed pale mouse-gray pubescence on outer side, the four hindmost with black hairs on inner surface. Hind tibiæ somewhat dilated, and bearing a sharp tooth near the end, close to the origin of the spurs. Pubescence of basal joint of tarsi as described for tibiæ; basal joint of hind tarsi dilated, flattened, with a short tooth at the side. Intermediate tarsi simple and ordinary. Basal segment of abdomen with long pale ochraceous hairs; the remaining segments with thin, appressed, grayish-white pile on their hindmost halves, not forming bands. Hind margins of segments narrowly hyaline. Extreme apex with black hairs. The eyes in life are of a beautiful dark green.

♀. Similiar, but the pubescence more cinereous, and on occiput and the whole dorsum of thorax strongly mixed with black. Face and antennæ wholly black, mandibles with a pale line. First joint of flagellum about or almost as long as $2 + 3 + 4$. Middle of 5th abdominal segment with black hairs, sides with white hairs. Basal joint of hind tarsi with a conspicuous black brush. Wings perfectly clear as in the ♂.

Habitat.—Common at Mesilla and Las Cruces, New Mexico. I first took this species on *Solanum eleagnifolium*, at Las Cruces, July 13, 1893 [Ckll., 313]. The specimen, a ♀, was identified by Mr. Fox as *urbana* of Cresson. Later, I found both sexes at Las Cruces, visiting the flowers of *Ipomœa*. At Mesilla, in the fourth week of June, the species was observed in great numbers, nesting in adobe walls. Up to the present day (June 23) I had no doubt that the insect was really *urbana*, but on more particularly examining a ♂, it was at once evident that it was a distinct species, and further study indicated that it was new. As in the fly-genus *Dolichopus*, this section of *Podalirius* presents us with a

series of females only with great difficulty to be distinguished, but accompanied by males presenting remarkable differences in the armature and clothing of the legs. The females of *P. lesquerella*, Ckll., ined., are very like those of *P. vallorum*, but are somewhat larger, have rather shorter antennæ, and fly earlier in the year—in April. But the males of *lesquerella* present a remarkable broad brush of black hairs on the last joint of the middle tarsi, while the basal joint of the hind tarsus is ordinary and unarmed.

The ♀ of *lesquerella* I have recognized in two specimens taken by Miss Jessie Casad: one at *Lycium* on the College Farm, Mesilla Valley, April 16; the other on cherry, at Mesilla, April 14. In size and general appearance it is like the ♂.

A NEW GRAIN BEETLE.

BY F. H. CHITTENDEN, WASHINGTON, D. C.

The recent discovery that the grain-feeding tenebrionid, *Palorus melinus* or *depressus* of American collections and literature, was in reality composed of two distinct species, as announced by the writer in the May number of *Entomological News* (Vol. VII., p. 138), finds a parallel in the recognition of *Silvanus mercator*, Fauvel, in local collections with *S. surinamensis*, Linn.

The former was not described until 1889 (see *Revue d'Entomologie*, Vol. VII., p. 132), and has hitherto been unrecognized in America, although M. Fauvel surmised that the species was cosmopolitan, from its relationship to *surinamensis*, *et al.*, and its occurrence in France, New Caledonia, and Africa.

From examination of between two and three hundred specimens brought together mostly by myself, in connection with the investigation of insects affecting stored products, for the Division of Entomology of the U. S. Department of Agriculture, I am able to verify this opinion regarding its distribution. This material includes an example from Kaiffa, Syria, identified by one of our first European authorities, Mr. Edm. Reitter. At the Columbian Exposition I collected examples in exhibits of cereal and other seeds from Venezuela, Liberia, and Italy; from the Atlanta Exposition were also obtained specimens from Venezuela; and quite recently the species was received at the Department of Agriculture, in a lot of ground flaxseed, from Mr. H. G. Wolfgang, of Calla, Ohio. There are in the National Museum specimens from Los Angeles, Cal.,

and Astoria, Ills., and I have now living material from an unknown source, but taken at Washington, D. C. To this list of localities may be added Lower California and Arizona, from the collection of Mr. Henry Ulke, of this city.

The close relationship of *mercator* to *surinamensis* makes reasonably certain their virtual identity as regards development, nor is it probable that they differ in any degree in food habits.

The principal points of structural difference between these two species may be best expressed in tabular form, thus :—

Tempora long, equal to about $\frac{2}{3}$ the diameter of the eye ; ♂ with side margins of front strongly reflexed, and with trochanters large, terminating in a spine.....	<i>surinamensis</i> .
Tempora very small, tuberculiform, equal to about 1-5 the diameter of the eye ; ♂ with side margins of front less prominent, trochanters unarmed	<i>mercator</i> .

A third species, *S. bicornis*, Er., also strongly resembling *surinamensis*, and differing chiefly in having the side margins of the front developed into two conspicuous horns, has similar habits, and as it is apparently better known in Europe than *mercator*, may occur with us, though as yet I have been unable to discover it.

NOTE ON MAMESTRA COMIS.

BY A. RADCLIFFE GROTE, A. M.

This species is described by me in Bull. Buff. Soc., N. S., III., 85, not in the Geological Survey, as quoted in the Washington Catalogue. A comparison of the description proves that the insect before me could not have been *M. olivacea*. Its terms, both as to colour and markings, completely cover the description of *M. circumincta*. There can, of course, be no reasonable doubt that the existing so-called "type" of *comis* is a specimen of *olivacea*, in which case the type label has been certainly transferred to another specimen after the type of *comis* was returned to Mr. Hy. Edwards. I do not remember that my type of *comis* was peculiarly set. The species was so much more vividly coloured that it did not even suggest to me *olivacea*, a species of which I possessed a long series.

MR. CARL F. BAKER spends most of the summer collecting in choice localities, up to 12,000 feet altitude, in the mountains of Northern Colorado. After October 1st, his address will be Auburn, Alabama, where he goes to fill the position of Entomologist in the A. and M. College.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XVIII. THE CHRYSOMELIDÆ OF ONTARIO AND QUEBEC—(*Continued*).

TRIBE VIII.—CHRYSOMELINI.

Most of the members of this tribe are of at least moderate size, and are often quite ornately coloured. In form they are usually robust and convex, while lacking the rotundity of the Cryptocephalini. The genera of Eastern Canada may be arranged thus, the characters used being in the main drawn from the Leconte and Horn "Classification":—

- A. Anterior coxal cavities closed, metasternum long; reddish-yellow above, with black stripes. *Entomoscelis*.
- AA. Anterior coxal cavities open.
 - b. Claws simple, not toothed.
 - c. Tarsi with third joint entire or scarcely emarginate.
 - Prothorax not margined at base; species rather elongate, slightly convex, striped. *Prasocuris*.
 - Prothorax margined at base; species larger, more robust and convex.
 - Last joint of palpi truncate. *Doryphora*.
 - Last joint of palpi dilated. *Chrysomela*.
 - cc. Tarsi with third joint emarginate or bilobed.
 - Elytra spotted or spotted and striped. Prothorax with a thickened margin. *Lina*.
 - Elytra unicolorous, not spotted nor striped, except that the metallic gloss is sometimes intensified over longitudinal lines.
 - Elytra with regular punctured striæ. *Plagioderæ*.
 - Elytral punctuation dense and confused. . . . *Gastroidea*.
 - bb. Claws toothed or bifid.
 - Tibiæ dilated and toothed near the tip. Species of oblong, rather convex form; yellow with black spots. . . *Goniocтена*.
 - Tibiæ slender, neither dilated nor toothed. *Phyllodecta*.

ENTOMOSCELIS, Chev.

E. adonidis, Fabr., is about .33 in. long, less robust than most of the Chrysomelini; the upper surface of the body dark reddish-yellow; the mouth-parts, sides of head, broad median stripe (and usually small lateral spot) on thorax, suture, and broad lateral stripe on elytra, black.

Antennæ, legs, and most of the under surface, excepting the sides of the prothorax, black. It is found both in America and Europe, and has here gained an additional importance through its destructiveness to turnips, radishes, and cabbages in the Western Provinces.

PRASOCURIS, Latr.

Elongate species of less convex form than usual, upper surface striped with yellow and brassy-green or bronze-black. The three species are thus separated by Mr. Crotch:—

Each elytron with two yellow vittæ not confluent at base. .24

in.....*phellandrii*, Linn.

Yellow vittæ of elytra confluent at base.

Legs black. .18-.22 in.....*obliquata*, Lec.

Tibiæ pale (= *varipes*, Lec.). .14-.18 in.....*vittata*, Oliv.

DORYPHORA, Ill.

Contains two large species of robust and convex form and bright colours. *D. decemlineata*, Say, the "Colorado potato-beetle," is almost too well-known to need a description — its yellowish colour, with black-spotted thorax and the five black stripes (the second and third of which are united at tip) on each elytron, rendering it easily recognizable. *D. clivicolis*, Kirby, is found on milkweed, and reaches a size of from .32 to .48 in. It is of a dark blue, the elytra orange-yellow, usually with three black spots on each, arranged thus: One on the humerus, one near the apex, and one on the suture, confluent with its fellow on the opposite elytron. The spots may all become confluent laterally, thus forming two broad blue bands, or, as in the variety *Rogersii*, Lec. (which is described as having the sides of the thorax nearly parallel behind), may become very much reduced in size and break up into numerous smaller ones.

CHRYSOMELA, Linn.

The species of this genus are more numerous and usually smaller than those of *Doryphora*, to which they bear a general resemblance. They are usually taken by sweeping. I find *C. exclamatoris* on *Helianthus*, while *C. elegans* is occasionally abundant on willows. The following table will enable the Canadian species to be separated without much trouble:—

A. Elytra with tolerably regular stripes, never with numerous spots.

b. Front and side margins of prothorax pale, sometimes the base also.

- c. Each elytron with more than one vitta besides the sutural one.
First vitta free from the suture for its entire length, the fourth interrupted. .28-.30 in. *exclamationis*, Fabr.
First vitta uniting with the sutural, second and third confluent towards the apex, fourth much reduced. .22-.28 in. *conjuncta*, Rog.
- cc. Each elytron with broad sutural and one lateral vitta, thorax with black or dark brown discal mark of variable size, rarely reaching the base. .20-.25 in. *elegans*, Oliv.
- bb. Thorax unicolorous, brownish, more or less bronzed. Elytra with from one to three stripes besides the sutural.
- d. Last joint of palpi very large. .24-.32 in. *lunata*, Fabr.
- dd. Last joint of palpi moderate.
Claws approximate, form more oval. .21-.26 in. *suturalis*, Fabr.
Claws not approximate, form more oblong.
.24-.30 in. *similis*, Rog.
- AA. Elytra with irregular spots, forming more or less labyrinthine patterns; sometimes coalescent, but not forming regular stripes except close to the suture.
- e. Thorax green.
- f. Elytra with spots well separated.
Suture green, first vitta coalescent with it. .28-.40 in. (Fig. 21). *scalaris*, Lec.
Suture not green, first vitta free. .24-.35 in. *philadelphica*, Linn.
- ff. Elytral spots coalescent, forming a reticulate pattern. .30 in. *labyrinthica*, Stal.
- ee. Thorax either entirely pale or with front margin so; elytral spots very numerous.
.26-.35 in. *multipunctata*, Say.



FIG. 21.

The variety of *multipunctata* called *Bigsbyana* by Kirby is distinguished by the large, dark basal thoracic spot. *C. spirea*, Say, is catalogued as a variety of *philadelphica*, and seems to form a link between that species and *scalaris*, since the sutural line is common and is joined to a shorter lateral one on each side near the base. An interesting paper on the group AA, by Mr. G. W. J. Angell, may be found in the first volume of "Entomologica Americana." His investigations go to show the extreme difficulty of sharply separating the species, though the majority of specimens will give no trouble in their identification.

LINA, Meg.

Two species are known from within our limits, both of them oblong insects of moderate size, less convex than *Chrysomela*. The under side of the body, the head above and a broad dorsal thoracic stripe with small lateral dot are usually black or greenish-black; the elytra, in cabinet specimens yellowish or sometimes slightly reddish with black spots. These spots, in *L. lapponica*, Linn., are rounded, or when confluent form transverse bands, while in *L. scripta*, Fabr., they are more elongate, even linear on the disc, and tend to form longitudinal vittæ. A form of *L. lapponica* in which the ground colour of the elytra is red is often found in spring on willows, sometimes mixed with the ordinary yellowish form; sometimes nearly the whole generation may be red, as is the case at Iowa City this year. *L. scripta* occurs chiefly on poplars and cottonwoods; a variety called *confluens*, by Rogers, has the elytra entirely dark except the outer margins; and a form with green elytra is mentioned by Mr. Crotch;—they may be distinguished, however, from the varieties of *lapponica* by having the claw-joint dentate. My specimens of *lapponica* range from .25 to .32 in., while *scripta* averages a little longer.

PLAGIODERA, Redt.

Oval insects of small size and green or blue colour, the upper surface convex, shining; elytra punctato-striate. I usually find them under boards in spring. Mr. Crotch thus separates the two from Canada:—

Elytral interstices finely punctulate, callus visible. .13-.17

in..... *cochlearia*, Gyll.

Elytral interstices subrugulose, no callus. .14-.16 in...*viridis*, Melsh.

The name *cochlearia* is replaced, in the third supplement of Henshaw's Check List, by *armoracia*, Linn.

GASTROIDEA, Hope.

Contains small species of oblong form, easily recognized by their resemblance to the common *G. polygoni*, Linn., so abundant on knot-grass. Following the arrangement of Mr. Crotch, they may be thus distinguished:—

Thorax and legs reddish; elytra green or blue.....*polygoni*, Linn.

Elytra golden, suture purple; thorax golden, usually purplish on edges.....*viridula*, DeG.

Blue or green, head flat, punctuation fine.....*cyanea*, Mels.

The name *viridula* replaces *formosa*, Say. All of the above are small insects, ranging from .16 to .20 inch in length.

GONIOCTENA, Redt.

G. pallida, Linn., is found on willows and poplars. It is .25 in. long, yellowish-testaceous, the top of the head and a thoracic spot of variable size (usually attaining the base) blackish. Under surface of body dark, especially towards the middle, tip of abdomen and sides of thoracic segments paler. Legs pale, elytra yellowish or reddish, occasionally nearly piceous, sometimes spotted with black, sometimes immaculate or with only a trace of the spots.

PHYLLODECTA, Kirby.

The Canadian species of *Phyllodecta* seems to be the same as the European *P. vulgatissima*, Linn. It is of oblong-ovate form, not very convex; bluish, greenish or bronzed; thorax distinctly, not very closely, punctured; elytra punctato-striate. Legs black; antennæ black, except the basal joints, which are more or less piceous or ferruginous. Length about .18 in. There are also existent records of *P. vitellina*, Linn., but no specimens have been seen by us, and Dr. Hamilton, to whom we wrote for further information, has expressed the opinion in a letter that all of the Eastern forms belong to the one species. Linnæus has described *vitellina* as being a shorter, less oblong form than *vulgatissima*. The descriptions of some of the older English writers probably confound more than one species, according to the word of Dr. Hamilton, who doubts the occurrence of the true *vitellina* in North America.

NOTES ON APHILANTHOPS AND DESCRIPTION OF A
NEW SPECIES.

BY S. N. DUNNING, HARTFORD, CONN.

Aphilanthops Bakeri, n. sp.

♂. Length, 8.5–10 mm.; of anterior wings, about 6–7 mm. Black with bright yellow markings. Head nearly quadrate, a little wider than high, closely and finely punctate. Eyes entire, elongate oval, inner margins parallel, inclined to light olive green. Ocelli in a triangle, the first a little larger than the last two, and located at the base of a slight cavity. A small cavity back and on the outer side of each of hind ocelli. Head covered with a sparse growth of long whitish pubescence, becoming thicker on face and back of eyes. Clypeus yellow and rounded, with two distinct lobes, each just inside of an imaginary line drawn straight down from base of antennæ, also a small but less distinct lobe between

these two, very slightly blackened between, and including lobes. Mandibles yellow outwardly, rufous tipped. A narrow curved yellow line just behind eyes. Sides of face yellow, same extending above base of antennæ on both sides and between. Overlapping base of mandibles is a small fringe of whitish hair. Scape of antennæ yellow-ringed at tip and below, above black, but yellow predominating. First joint flagellum, short, black, rounded, about one-third as long as second, which, with four following joints; is distinctly rufous below, and either rufous above or inclined to black; rest of antennæ black, except the rufous tip. Thorax black and covered with a sparse growth of whitish hair. Collar, sometimes spot below, tegulæ, tubercles and curved spot just back of tubercles, and a V-shaped mark below and a little back of this, transverse band on scutellum and post-scutellum, and spot on posterior lateral angles of metathorax, yellow. Mesothorax finely punctate, but not as closely so as head. When viewed from the side appears slightly ridged. Scutellum and post-scutellum rather more sparsely punctate. Metathorax with a slight rounded cavity. Abdomen black and banded with yellow; 1-6 segments each with a band, interrupted and slightly sinuose on first, either interrupted or narrowed on second and sixth, 3-5 narrowed in centre; terminal segment black, inclined to rufous at extreme tip; with a short growth of whitish hair, finely and closely punctate. First ventral either with or without a yellow spot and three or four yellow bands (growing smaller towards tip) on succeeding segments, the last band interrupted. Hind margin of first three or four segments above inclined to rufous. Legs yellow and black. Fore coxæ yellow tipped and yellow anteriorly, black posteriorly. Trochanters yellow tipped and yellow inwardly, outwardly black. Femora, first four-fifths outwardly black, rest yellow. Tibiæ yellow, with small dark spot inwardly and feebly spinose, slightly inclined to rufous at tip, as are all joints of tarsi except first, which is yellow. Middle and hind legs marked about the same, though either yellow or black may predominate on coxæ and trochanters. Wings inclined to dusky, nervures and stigma inclined to ferruginous. Marginal cell a little longer than first submarginal, appendiculate at apex. First submarginal about as long as the second and third combined on the cubital nervure, the second receiving recurrent nervure near centre, third receiving the nervure at end of first, fourth from second. Stigma with a light-coloured spot before.

Described from two male specimens belonging to Mr. Carl F. Baker

(after whom I have taken the liberty of naming this very pretty species), both from Colorado. [Baker, No. 1631 and 1636].

A. taurulus, Ckll.

A specimen which I have before me [Ckll., No. 4935, Las Cruces, N.M., ♂] differs from Mr. Cockerell's description as given in Trans. Am. Ent. Soc., XXII., p. 293, viz.: Bands on third and fourth segments distinctly separated instead of merely narrowed ventrals hold one band instead of three, and where the others should be are two very small yellow spots apiece. Middle tibiae are lemon-yellow without and rufous black within, instead of "yellow without and lemon within." Hind tibiae have first two-fifths all yellow and last three-fifths all black, and not "yellow without and black within, but wholly yellow at their proximal and wholly black at their distal ends." The sixth segment contains a small yellow dot.

A. 4-notatus, Ashm.

I have two ♂♂ before me. One from Colorado [Baker, No. 1631] and one from Montana, through the kindness of the Am. Ent. Soc. The yellow is a little brighter and more extended in the Colorado than in the Montana specimen, which has the third abdominal band separated, while in the Colorado specimen it is hardly narrowed. Mr. Ashmead's description says: "Mandibles yellow, tips black"; both of above have the yellow confined to base of mandibles, then rufous, and tips black.

A. Utahensis, Baker.

Through the kindness of Mr. Baker, I have had the type of this pretty little species for examination.

A. laticinctus, Cr.

Two males from Colorado were examined [Baker, Nos. 1631 and 1591].

A. frigidus, Sm.

Five ♀♀. Three from Hartford, Conn.; July 30th, two, and August 6th, one (1893). One from Chicago, Ill., July 31, '92, and one from Asbury Park, N. J., July 14, '93. Mr. Baker reports this from Colorado. One specimen shows no yellow on thorax, except band on collar. This was taken at Hartford, August 6th, 1893.

The above notes would tend to show that the abdominal bands are unreliable and vary greatly.

Our species may be separated as follows:

- A. Clypeus strongly tridentate, ground colour rufous throughout..... *Utahensis*, Baker.
- B. Clypeus not strongly tridentate, ground colour of at least head and thorax black.....
1. Last dorsal segment pointed, convex, legs yellow and black.
 - a. Bands of abdomen broad, continuous; clypeus yellow, size small..... *laticinctus*, Cr.
 - b. Bands, especially first three, narrow or interrupted, size larger.
 1. Clypeus face and antennæ black, except for two small yellow spots on face near base of mandibles..... *taurulus*, Ckll.
 2. Face with three broad yellow stripes, middle one shortest..... *frigidus*, Sm.
 3. Face all yellow..... *Bakeri*, Dun.
 2. Last abdominal segment rectangular and strongly concave, clypeus margined with yellow..... *4-notatus*, Ashm.

This table is Mr. Baker's, and is merely adapted to contain the new species. It was first published in CANADIAN ENTOMOLOGIST, XXVII., p. 335-6.

EXPERIMENTAL FARMS OF THE DOMINION OF CANADA.

The annual report of the Director and his assistants for the year 1895 is a goodly volume of over 400 pages, octavo, and is full of valuable and interesting matter. The portion contributed by Dr. Fletcher, the Entomologist and Botanist, contains notices of a large number of injurious insects that have attracted attention during the season in various parts of the Dominion, most of them being familiar pests. Among the less well-known insects referred to may be mentioned the "joint-worm," *Isosoma hordei*, Harris; the "cottony grass-scale," *Eriopeltis festuæ*, Fonsc.; the "cigar case-bearer," *Coleophora Fletcherella*, Fernald; the "peach bark-borer," *Phlæotribus liminaris*, Harris; the "black peach-aphis," *Aphis persicæ-niger*, Smith; the "New York plum-scale," *Lecanium cerasifex*, Fitch; and the "carrot-fly," *Psila rosæ*, Fab. The most injurious insects of the year appear to have been the grasshoppers of various species, which were excessively abundant in Ontario and the Eastern Provinces.

Dr. Fletcher includes in his report the experiments in bee-keeping carried on under his supervision at the Ottawa Farm, and closes with an account of some of the specially noxious weeds that are proving very troublesome in Manitoba and the Northwest. On the whole, we look upon this report as one of the most useful and interesting that our Dominion Entomologist has yet published.

INDEX TO THE MANTIDÆ OF NORTH AMERICA, NORTH OF MEXICO.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

In 1889, Westwood, in the Synopsis of the then known Mantidæ, prefixed to his *Revisio insectorum familiæ Mantidorum*, credits to North America, north of Mexico, nine species belonging to five genera,—Goniatista, Oligonyx, Thesprotia, Mantis, and Stagmomantis. Several species were overlooked by him, and in reality up to the present time twenty-three nominal species have been at different times credited to this region and referred to ten genera,—Ameles, Empusa, Phasmomantis, Stagmatoptera, and Theoclytes, besides the foregoing. Several of the species, however, have been erroneously credited to this country, such as *Empusa gongylodes* and *Mantis gemmata*, both of which are East Indian. Several of the names, moreover, are synonyms of others, so that the number of species these references represent is speedily reduced more than one-half. All of these but *Mantis Wheeleri* Thom., *Phasmomantis sumichrasti* Sauss., and *Oligonyx Uhleri* Stål, I have seen, and to them can add several more not before recognized in the region in question, six of them being apparently hitherto undescribed, together with one genus. The total number of species is fifteen or sixteen, and of genera, eleven, only three of the genera—Litaneutria, Stagmomantis, and Oligonyx—having more than one species; undoubtedly more forms will be found in the West and South.

The group is thus seen to be almost as poorly represented in temperate North America as the Phasmidæ [See CAN. ENT., XXVII., 29]. No species is known to occur in Canada, though a single species or two may possibly be looked for in Southern Ontario and in Assiniboia. The genera, with one exception, belong to the subfamily Mantinæ, and may be separated by the following table, largely adopted from those already given for these insects, by Stål, Bruner, and de Saussure. I add at the end a revision of the nomenclature of the described species, and a determination of the species figured by Glover.

TABLE OF THE GENERA.

A'. Upper surface of middle and hind femora and tibiæ rounded; head unarmed (MANTINÆ).

b'. Inner margin of upper surface of fore coxæ not conspicuously dilated apically.

- c'. Pronotum but slightly longer than fore coxæ; eyes more or less conical; hind femora armed exteriorly with an apical spine.
- d'. Eyes distinctly pointed (conico-acuminate) above; hind femora delicately incrassate basally, in the ♀ nearly twice as long as the pronotum; tegmina and wings abbreviate or wanting in both sexes; cerci long, distinctly surpassing the infragenital plate..... *Yersinia*.
- d'. Eyes trigonal, scarcely pointed above; hind femora linear, in the ♀ but little longer than the pronotum; tegmina and wings fully developed in the ♂, abbreviate in the ♀; cerci short, not or scarcely surpassing the infragenital plate..... *Litaneutria*.
- c'. Pronotum much longer than fore coxæ; eyes rotundate; hind femora with no apical spine.
- d'. Antennæ filiform.
- e'. Broadest portion of pronotum far in advance of the middle, the sides in front distinctly tapering; outer margin of fore femora armed with main spines only.
- f'. Body of ♂ very elongate; anal membrane of tegmina violet..... *Phasmomantis*.
- f'. Body of ♂ moderately elongate; anal membrane of tegmina light coloured.
- g'. Anal and axillary veins of tegmina independent and simple throughout..... *Callimantis*.
- g'. Anal and axillary veins of tegmina apically confluent..... *Stagmomantis*.
- e'. Broadest portion of pronotum hardly in advance of the middle, the sides in front parallel or subparallel; outer margin of fore femora armed with numerous distinct spinules between the main spines.. *Gonatista*.
- d'. Antennæ incrassate beyond the base and thereafter tapering..... *Brunneria*.
- b'. Inner margin of upper surface of fore coxæ abruptly and considerably dilated at apex.
- c'. Fore tibiæ longer than their apical claw.

- d¹. Fore and hind sections of pronotum subequal in length *Oligonyx*.
 d². Hind section of pronotum twice as long as fore section *Bactromantis*.
 c². Fore tibiæ no longer than their apical claw *Thesprotia*.
 A². Upper surface of middle and hind femora and tibiæ carinate ; middle of head with an erect process as long as the head (VATINÆ)
 *Theoclytes*.

SUBFAMILY MANTINÆ.

YERSINIA SAUSSURE.

I know of but a single and undescribed species in the United States, of which I have specimens obtained by Morrison, in Colorado, on the plains at the base of the Rocky Mountains, and by myself at Garland, Costilla Co., Colorado, at a height of about 8,000 feet. Probably it is this species which Bruner found in Western Nebraska and referred (Publ. Nebr. Acad. Sci., 1893, 22) doubtfully to *Y. mexicana*. The species, which may be called *Y. solitaria*, is slenderer and slightly smaller than *Y. mexicana*, and is apterous in both sexes.

LITANEUTRIA SAUSSURE.

The only species of this genus heretofore known as such was described from Sonora, but we have more than one species in the West. One is *L. minor* (*Stagmatoptera minor* Scudd.), figured by Glover (Ill. N. A. Ent., Orth., pl. 13, fig. 12), and of which I have seen specimens from Texas, New Mexico, Utah, Colorado, and Nebraska. It was originally described from the ♀ only. A very small ♀, apparently of this species, from Bridger Basin, Wyoming, is in the Museum of Comp. Zoology. Bruner has also sent me specimens from Arizona, California, and Kansas, and it is probably the "Ameles sp." mentioned by him (N. A. Fauna, VII., 266) as found in New Mexico, Arizona, California, Southern Idaho, and Middle Nevada. The undescribed "Ameles borealis" of Bruner (Publ. Nebr. Acad. Sci., 1893, 22), from Northern and North-western Nebraska, of which he has kindly shown me a pair of ♀'s, is perhaps distinct from it, with smoother pronotum. Another species, closely allied to this, differing indeed only, so far as I have seen, in the far greater depth of the fuliginous mottling of the wing of the male (both have the same large sub-basal fuligino-fuscous spot, seen also in *L. ocularis* Sauss.), is apparently undescribed, and occurs in Arizona, South-

ern California and Lower California ; it may be called *L. obscura*. I have also females from Utah and New Mexico which may belong to either of the above. Still another species occurs in Northern California, in the Shasta region, in which the wings are feebly and uniformly fuliginous, having no sub-basal fuligino-fuscout spot ; it may be called *L. pacifica*. In all of them the front border of the tegmina is griseo-pellucid, and thus different from the Sonoran *L. ocularis* ; this last species comes nearest *L. minor*. The males in this genus are fully winged, the females brachypterous and of a very different appearance.

PHASMOMANTIS Saussure.

P. sumichrasti Sauss., a Mexican species, is reported by Saussure and Zehntner (Biol. Centr. Amer., Orth., 149) as found in Texas. I have seen no specimen of the genus from the United States.

CALLIMANTIS Stål.

I place in this genus a single species which differs considerably from the type, *C. antillarum* (Sauss.), in general livery and in lacking any apical spine to the hind femora. It is an undescribed species from Florida, a trifle smaller than *C. antillarum* and closely resembling a miniature *Stagmomantis carolina*. It may be called *C. floridana*. I have only seen the male, which was probably green in life, but is now uniformly testaceous, the tegmina hyaline, without stigma, the costal margin like the rest, and the first ulnar branch completely simple ; the wings are hyaline, but are rather sparsely tessellate with fuscous in their posterior third, and the ulnar vein is simple ; the proportions and general shape of the pronotum are those of *Stagm. carolina*, and, as there, it is unarmed ; the anterior upper margin of the fore coxæ is armed with slight, distant spines, and the hind femora and tibiæ are tipped apically with fuscous. The expanse of the tegmina is 45 mm.

STAGMOMANTIS Saussure.

Of this genus I can recognize but two species, *T. carolina* (Linn.) and *S. limbata* (Hahn), readily distinguished by the great and uniform width of the costal field of the tegmina in the ♀ of the latter, where it is nearly one-third the entire width of the tegmina, and the green colour and opacity of the same field in the ♂. The former species is strongly dimorphic in the ♀, one form (*carolina*) having the tegmina strongly mottled with fuscous and the wings strongly fuliginous throughout, with a deep patch at the apex ; the other (*dimidiata*), which is generally

classed as a distinct species, is entirely green, but with the posterior half of the wings sometimes strongly infuscated in the cells. As occurring in the United States, I do not see how the two forms can be specifically separated, as there are no similar distinctions in the very variable male, which is never green, but in which the tegmina may be wholly hyaline except along the costal margin, or they may be flecked with fuscous, or wholly suffused with fuliginous, while the wings vary from wholly hyaline to wholly fuliginous, with a tendency to a greater amount of fuliginous posteriorly. In some specimens from Las Cruces, N. Mex., the base of the wings is feebly violet. The species appears to be even more variable in Mexico, and the South American forms referred to *dimidiata* seem also to belong here. In the United States it is found (both forms indiscriminately) along the entire southern tier of States and territories from Florida to Arizona (Ft. Buchanan, south of Tucson, and Ft. Whipple, near Prescott), but I have neither seen nor heard of specimens from the Pacific Coast proper. From here it ranges north to Maryland, southern Illinois, Missouri, Kansas, and Utah, to judge from specimens seen by me. It is also reported from New Jersey [Smith], Pennsylvania [Westwood], Kentucky [Garman], and Nebraska [Bruner]. Saussure credits it to Cuba and Bolivar, accordingly, places it in the Cuban list, but says it does not exist in the Gundlach collection. On the other hand, I have received it from Gundlach under the number 3. It is also found at Key West. It is in the highest degree probable that Thomas's *Mantis Wheeleri* belongs to this species and probably to the form named *tolteca* by Saussure, which Saussure and Zehntner have separated as a distinct species. It seems to me rather a geographical race.

S. limbata (*viridimargo* and *cellularis* Burm.; *longipennis* Sauss.) has never been reported from the United States, but is found on our extreme Southern borders, as I have seen specimens taken at Matamoras, Mex., just over the border, on the Rio Grande; from the old Ringgold Barracks, on the lower Rio Grande [Schott]; an unspecified point in Texas, Schaupp [Henshaw]; Arizona, Morrison [Henshaw]; and Las Cruces, N. Mex. [Cockerell].

GONATISTA Saussure.

We have a single species of this genus in the United States, *G. grisea* (Fabr.), which has many synonyms. It occurs in Cuba and San Domingo, and rarely in the Eastern United States, where it is probably an interloper. I have specimens from Key West and Fernandina, Fla., and from Georgia, and recently Mr. Blatchley sent me a specimen taken in Indiana. It was figured by Glover (pl. 16, figs. 13-15) as from Florida.

BRUNNERIA Saussure.

A single female specimen of this genus, remarkable for its peculiar antennæ, is in my collection, collected by Aaron on the Gulf Coast of Texas. It is distinct from the species heretofore described, all four of which come from S. America, the genus being unknown in Mexico and Central America. It may be called *B. borealis*. It is completely apterous, very elongate and slender, greenish with a ferruginous tinge which is predominant on the thorax; the antennæ, pallid at base, are pale ferruginous in the swollen portion, growing luteous beyond; the posterior part of the pronotum is three times as long as the anterior and is rather distinctly beaded with tubercles or blunt spinules along its lateral margins; the supra-anal plate is sublanceolate, much longer than its basal breadth, and the cerci slender, delicately tapering, about half as long as the fore femora. Length of body about 50 mm.; of antennæ about 12 mm. This specimen is doubtless immature, for a second, much larger, mature specimen from Texas, obtained by A. Agassiz, is in the Museum of Comp. Zoology. It has short and broad tegmina, reaching only the middle of the metanotum, and the body is 88 mm. long.

OLIGONYX Saussure.

Three species belonging to this genus, as latterly restricted, have been described from the United States: *O. Scudderi* Sauss., from Georgia; *O. Uhleri* Stål, from Louisiana; and *O. bollianus* Sauss.-Zehntn., from Texas and Northern Mexico. The first has also been credited, by Stål, to Texas, and is figured under this name by Glover (Ill. N. A. Ent., Orth., pl. 16, fig. 11, ♀), and as *Mantis missouriensis* Riley, by the same (Ibid., pl. 13, fig. 11, ♂). Whether these nominal species are distinct from one another I have not now sufficient means of deciding. *O. Scudderi*, though labelled as coming from Georgia, was originally thought by Saussure to really come from Central America, but he is now evidently of a different opinion, as it is not included in the *Biologia Centrali-Americana*. I have a specimen from Carolina which agrees with his description of *O. Scudderi*, and an immature specimen, apparently of this genus and about 6 mm. long, was found with others running about in a house in Waterville, N. Y., and sent to Mr. J. A. Lintner with enquiries. It proved to have probably hatched from eggs accidentally sent in the "moss" (*Usnea*) used in packing a barrel of oranges from Florida. So the genus occurs in the South-eastern States. My Carolina specimen is a trifle

stouter than numerous specimens from Texas (Boll, Belfrage, Lincecum), which altogether agree with *O. bollianus*, as do specimens sent me from Lincoln, Nebr., by Bruner, as *Mantis missouriensis*. I am therefore inclined to believe these two supposed species to be identical, and probably distinct from Stål's darker *O. Uhleri*, which I have not seen.

BACTROMANTIS (βάρτρον, Mantis), gen. nov.

Closely allied to *Oligonyx*, and, indeed, equivalent to the second division of that genus by Stål (Bihang K. Svensk. Akad. Handl., iv., No. 10, 67), to which he refers an unnamed species from Mexico. It comprises those species hitherto placed in *Oligonyx* (Stål, emend.) as have a very elongate instead of abbreviate pronotum, in which the hinder section is fully twice as long as the fore section. To it belongs only a single species from the United States, which may be called *B. virga* (possibly the species given in Westwood's Synopsis as *Thesprotia baculina* Bates MS., from Eastern Florida may be the same). I have only seen the apterous female; it is testaceous, the fore femora obscurely and narrowly banded with fuscous, the other legs greenish yellow; the apex of the femora broadly, the base and apex of the tibiæ narrowly, infuscated. Length of body, 43 mm.; of pronotum, 15 mm. Sandford, Fla.; collected by Frazer.

THESPROTIA Stål.

We have a single species of this genus, *T. graminis*, named by Bates and described by me many years ago as an *Oligonyx*. I described only the ♂; the ♀ is apterous. It occurs in Florida, from Key West northward, and in Georgia.

SUBFAMILY VATINÆ.

THEOCLYTES Serville.

I here follow Saussure rather than Stål in restricting Serville's genus to his first subdivision, or what Serville at the outset terms *Theoclytes propriè dicta*. The only species known in the United States is *T. chlorophaea* (Blanch.), which occurs throughout Mexico, and is said to extend, says Saussure, to the United States as far as New York. It was originally described from Watertown, N. Y., but has since been recorded only from Central America, Mexico, and Louisiana. Saussure remarks that it probably does not extend northward beyond the Southern States. This seems altogether probable. The only specimen I possess comes from just over the Texan border at Matamoras.

Revision of the Nomenclature.

Ameles borealis Brun., Publ. Nebr. Acad. Sc., 1893, 22 = *Litaneura borealis*.

Ameles mexicana Brun., Ibid., 1893, 22 = *Yersinia solitaria*?

" sp., Brun., N. A. Fauna, vii., 266 (1893) = *Litaneura minor*.

Empusa chlorophæa Blanch., Hist. Nat. Ins., iii., 2 (1840) = *Theoclytes chlorophæa*.

Empusa gongylodes Westw., Drury's Ins., i., 122 (1837), East Indian.

Gonatista grisea Sauss., Mant. Amer., 23 (1871) = *Gonatista grisea*.

Mantis carolina Linn., Syst. Nat., Ed. 12, ii., 691 (1767) = *Stagmomantis carolina*.

Mantis chlorophæa Blanch., Mag. Zool., v., 135 (1835) = *Theoclytes chlorophæa*.

Mantis conspurcata Serv., Orth., 190 (1839) = *Stagmomantis carolina*, ♂.

Mantis ferox Sauss., Rev. Mag. Zool., 1859, 60 = *Stagmomantis carolina*.

Mantis gemmata Stoll', Spectres 71 (1787), East Indian.

" *gongylodes* Drury, Ill., i., 129 (1770), East Indian.

" *grisea* Fabr., Ent. Syst., ii., 20 (1793) = *Gonatista grisea*.

" *inquinata* Serv., Orth., 191 (1839) = *Stagmomantis carolina*.

Mantis missouriensis Riley, Glov., Ill. N. A. Ent., Orth., pl. 13, fig. 11 (1872) = *Oligonyx Scudderi*.

Mantis phryganoides Serv., Orth., 198 (1839) = *Gonatista grisea*.

Mantis wheeleri Thom., Rep. Geol. Surv. 100th mer., v., 849 (1875) = *Stagmomantis carolina*?

Oligonyx bollianus Sauss.-Zehntn., Biol. Centr. Amer., Orth., 173 pl. 9, fig. 17 (1894) = *Oligonyx Scudderi*.

Oligonyx graminis Bates, Scudd., Proc. Bost. Soc. Nat. Hist., xix., 90 (1877) = *Thesprotia graminis*.

Oligonyx Scudderi Sauss., Mant. Amer., 121, pl. 2, fig. 24, 24a (1871) = *Oligonyx Scudderi*.

Oligonyx Uhleri Stål, Bih. K. Svensk. Akad. Handl., iv., No. 10, 66 (1877) = *Oligonyx Uhleri*.

Phasmomantis carolina Brun., Bull. Washb. Coll., i., 125 (1885) = *Stagmomantis carolina*.

Phasmomantis sumichrasti Sauss.-Zehntn., Biol. Centr. Amer., Orth., 149 (1894) = *Phasmomantis sumichrasti*.

- Pseudovates chlorophæa Westw., Rev. Mant., 24 (1889) = *Theoclytes chlorophæa*.
 Stagmatoptera minor Scudd., Rep. Geol. Surv. Nebr., 251 (1872) = *Litaneura minor*.
 Stagmomantis carolina Sauss., Mant. Amer., 46 (1871) = *Stagmomantis carolina*.
 Stagmomantis dimidiata Sauss., Ibid., 48 (1871) = *Stagmomantis carolina*.
 Stagmomantis minor Sauss., Ibid., 54 (1871) = *Litaneura minor*.
 Stagmomantis tolteca Sauss.-Zehntn., Biol. Centr. Amer., Orth., 143 (1894) = *Stagmomantis carolina*.
 Theoclytes chlorophæa Serv., Orth., 153 (1839) = *Theoclytes chlorophæa*.
 Thesprotia baculina Bates, Westw., Rev. Mant., 5 (1889) = *Bactromantis virgo*?

Explanation of the figures of Mantida

on the plates of Glover's Illustrations of N. A. Entomology, Orthoptera:—

Pl. 2. *Stagmomantis carolina* (Linn.).

Pl. 12, fig. 16. No name or locality is given; it probably does not come from the United States.

Pl. 13, fig. 11. *Oligonyx Scudderi* Sauss., ♂.

fig. 12. *Litaneura minor* (Scudd.), ♀.

Pl. 16, fig. 11. *Oligonyx Scudderi* Sauss., ♀.

fig. 13. *Gonatista grisea* (Fabr.), pupa.

fig. 14. " " ♀.

fig. 14a. " " ootheca.

fig. 14b. " " larva.

fig. 15. " " ♂.

A VARIETY OF *HEPIALUS ARGENTEO-MACULATUS*.

BY E. F. HEATH, "THE HERMITAGE," CARTWRIGHT, MANITOBA.

When Mr. Fletcher was looking over my cases of moths during the short visit he paid me last summer, he particularly noticed a series of *Hepialus argenteo-maculatus*, and suggested that a short description of a variety that I have taken here would be interesting.

This variety differs so much from the normal type that it might almost be a distinct species, but that is a point I cannot pretend to determine.

The ordinary specimens I have taken here measure from $3\frac{1}{4}$ to $3\frac{1}{2}$ inches across the expanded wing, but this variety only averages about 2 inches. The ground colour of the fore wings in the case of one female is almost white, with markings similar in pattern to those of the large variety, faintly outlined in greenish-brown; the wings are also rather more pointed than in the normal type. The hind wings are smoke-coloured, as are also the thorax and abdomen. In another specimen, a male, the fore wings are white with a slight shade of salmon colour, without any markings whatever; the hind wings are a shade or two darker, and the thorax and abdomen correspond in colour to the wings adjacent to them.

The habits of both varieties are very similar. I have taken both flying with their peculiar oscillating flight over low cherry scrub, or just on the verge of higher patches. It is a very curious sight to see several of these large moths performing their oscillations for several minutes over the same spot soon after sunset in the early summer—July; the flight being very rapid.

Here I believe the larva to feed upon both the wild black and red cherry, for I have once or twice shaken the pupa out of the roots of cherry scrub when digging some scrubby ground for a garden. I remember being much struck by the locomotive powers of one that I laid aside for a few minutes, and which managed to wriggle a considerable distance, comparatively, in a short space of time.

NOTE ON EUTOLYPE ELECTILIS.

BY A. RADCLIFFE GROTE, A.M., HILDESHEIM.

Prof. Roland Thaxter has sent me a specimen of what may be *E. electilis*, Morrison, and says: "The *Eutolype* is, as I suppose, *electilis*, and is subject to very great variation as to the depth and disposition of the darker shades and the clearness of the maculation, some being more or less obliterate and others on the plan of *Coelodasys biguttatus*, var. *cinereo-frons*." This is the first specimen I have had, and I can only say it represents a species distinct from *Rolandi* or *depilis*. Unfortunately, the abdomen is missing, and I cannot say if it is tufted. The black dash described by Morrison is incomplete. I saw the type in the Tepper collection, but had no opportunity of comparing it with the others. It reminded me, on a very cursory examination, of *muralis*, but as all the species have the peculiar facies of the group, this comparison goes for

nothing. In my Bremen List I suggest the identity of *bombyciformis*, Sm., with *electilis*, and this, considering what Prof. Thaxter says of the variability of *electilis*, may prove to be the case. The two descriptions do not contradict essentially. On page 59 of his paper, Prof. Smith says: "I do not know where Morrison's type is to be found." On page 57 he says: "There is a badly-rubbed specimen, I believe in the Tepper collection marked 'type' by Mr. Morrison, in which the basal dash is broad and suffused; but I did not otherwise compare it with the description." I may ask why this specimen is not Morrison's type, since all other types in coll. Tepper are pronounced without doubt to be "the type"? With such a variable species as *electilis* evidently is, I cannot do more than suggest that Morrison's type be looked up by Prof. Smith. This type must be still in the Tepper collection, from which Prof. Smith has again had types only recently in working the *Hyphenina*. To have this matter cleared up would be a great help, as "*electilis*" is cumbering our lists without being positively applied to any species in the collections.

JOHN B. LEMBERT.

The tidings of the tragic death of "the Entomologist of the Yosemite," as he was locally called, was a great shock to his many correspondents. On the 19th of April last, a passing Indian found the body of Mr. Lemberg lying dead in his cabin, with a large bullet-hole in his head, over the right temple. He had evidently been murdered, as the cabin was found locked on the outside with a padlock. The crime is supposed to have been the work of some Indian whom he had offended, as he had no money or other valuables. From the condition of the body it was considered that the murder had been committed about the first of April.

Mr. Lemberg was a native of New York, but had lived for many years among the mountains of California. He owned a bit of land at the headquarters of the Tolumne River, at an altitude of 9,000 feet, and lived there like a hermit till his property was included in the Yosemite Park. As he wrote me last year, he then lost his home and was "shut out of making a living from the stockmen. Mr. Dyar came along like an angel unawares, and, at the age of fifty-one, he commenced to collect insects, having been living in the sight of nature continuously for twenty years." He occasionally acted as guide to parties visiting the mountains, and in this way made the acquaintance of Mr. Dyar, who in-

terested him in entomology, and taught him how to observe and collect. This was in 1891. He was, therefore, 56 years of age at the time of his death, though supposed to be a very much older man. He succeeded in collecting a number of rare species, and made many careful observations on the life habits of these and others, some of which have been published in this and other entomological magazines. The last time I heard from him was in February, when he sent me some specimens and a note on the preparatory stages of *Arctia virginialis*. His untimely death is a loss to entomology, as he was a keen observer and diligent collector in a little-known locality, and had only just begun a work which would have been of great value. He lived all alone among the mountains, and has left neither wife nor child to mourn his departure. C. J. S. B.

COLIAS CÆSONIA.—In our last issue the capture of this butterfly at Toronto was recorded. Mr. James Walker, of Orillia, Ont., writes: "I saw numbers of *Colias Cæsonia* flying over a clover field to-day (July 13th). I captured four, two of which were perfect. I had only liberty to walk on the edge of the field, or I might have been more successful. Mr. Grant has also captured five or six."

Mr. E. F. Heath writes, from Cartwright, Manitoba: "On June 19th I captured a rather worn specimen of *C. Cæsonia*. A few days subsequently I had a distant view of what I took to be another example. On July 10th I chased, but did not succeed in capturing, a fresh-looking specimen, and on the 15th was fortunate enough to take a very good one. I have since seen one or two more. It is not very easy of capture when assisted by a prairie breeze. This is the first time I have noticed the butterfly during a residence in the country of sixteen years."

LIBYTHEA BACHMANI.—Mr. McDonough captured a specimen east of Toronto, in 1895, and one in his garden in the city on the 7th of June last. The only previous Canadian records are Port Stanley, London and Hamilton.

THECLA SHERIDANI.—No less than fifteen specimens of this extremely rare butterfly were taken in the foothills west of Fort Collins, Colorado, at the end of April, by Professor Gillette, of the State Agricultural College, Fort Collins, and Mr. S. T. Mason, of Denver, Colorado.

Mailed August 1st.

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No. 9.

A HOUSE-INFESTING SPRING-TAIL

(*Lepidocyrtus americanus*, n. sp.).

BY C. L. MARLATT, WASHINGTON, D. C.



FIG. 22.—*Lepidocyrtus americanus*, n. sp.

a, lateral view of female; b, foot; c, tip of spring; d, scale; e, labrum;
f, mandibles; g, maxillae and labium (original).

In the course of a comprehensive study of insects frequenting dwellings, attention was early drawn to a very handsome little Collembolan, which occurs commonly in moist situations in houses in Washington. It may often be found on window-sills, especially if there is unusual moisture from the presence of window plants, or in bathrooms, and, in fact, wherever moist conditions prevail. This species is a very handsome one, and seems, from reference to the authorities, to be undescribed. From the manner of its holding the head, bent downwards almost at right-angles to the thorax, it would seem to fall into the genus *Lepidocyrtus*, erected by Sir John Lubbock. In habit it has in Europe a close ally in *Seira domestica*, Nicolet, which, as its name implies, is a frequenter of houses, and is separated generically from *Lepidocyrtus* by rather unimportant characters. Before referring to this insect in a popular article, it seems desirable to have a technical description put on record, and the following characterization of the species has therefore been prepared:—

Lepidocyrtus americanus, n. sp.

Length, 1.5 mm.; with spring unfolded above 2 mm.; head bent strongly downward, as in *L. curvicolis*, Lubbock; antennæ 4-jointed, more than one-half length of body; basal joint not much more than one-half length of others, which are subequal; abdomen with four segments, the third of which equals one-third length of body; legs tapering, with minute terminal tarsal joint; armed at apex with large spur, notched at tip and below, which is a strong simple spur or spine; spring more than half length of body, jointed at centre, the apical portion bifurcated; densely clothed with long fine hairs; terminal rays very finely and regularly comb-notched on lower or posterior edge and somewhat curved downward at tip, with three or four short, rather distinct, teeth at extreme tip; catch a strong groove or sheath extending one-third length of venter of abdomen and grasping spring strongly up to middle joint; body clothed with flat striate scales, and dorsally with scattering heavy, almost clubbed, hairs; the anterior margin of pronotum is ornamented with very dense tuft or fringe of strong hairs; hairs of antennæ and legs for the most part fine and long. Colour silvery gray, marked with violet-purple, lighter on antennæ and legs and very dark on body markings; eyes black; antennæ, except base of lower joints, femora and tibiæ, with spot connecting antennæ, light purple; anterior and lateral margins of thorax, spots along side of body, hind margin of second, third and fourth abdominal segments, lateral spot on middle of third segment, dark purple, sometimes appearing almost black.

One-third and one-half grown specimens do not differ from adult notably, except in size and very slightly in coloration. The illustration which is presented herewith is sufficiently elucidated in the accompanying explanation. In the figure the head is bent up more than in its normal position in state of rest. The mouthparts are very difficult to work out. The labrum is simple. The right and left mandibles differ notably in the character of the teeth on their inner edges. The maxillæ and labium are of similar structure, consisting of large basal lobes, apically covered with long and rather dense brushes of hairs. The food of the insect, from the appearance of the alimentary canal, consists of particles of dust, possibly taken by the insect in its feeding on the moist vegetable moulds of decay which may be assumed to be its normal food, in the absence of any other evident material on which it could subsist.

STILL ANOTHER APHILANTHOPS.

BY T. D. A. COCKERELL, MESILLA, NEW MEXICO.

Aphilanthops concinnulus, n. sp. — ♀. Length, 9 mm. Rufous, with white markings, a rather obscure broad black band extending across vertex, including most of the ocelli, its lower margin concave, mandibles darkened towards tips, mid and hind tarsi darkened. The white or yellowish-white marks consist of a small spot on each lower corner of face, a small obscure suffused spot on mandibles near base, the prothorax above, the tegulæ except extreme base, the tubercles, a large patch behind tubercles having a linear oblique projection above, the anterior margin of scutellum, a spot on each side, the postscutellum, spots at the apices of anterior and hind femora, longitudinal bands on all the tibiæ, a large patch on each side of the first three abdominal segments, a band on the fourth, a broad quadrate spot medially on the fifth. Venter immaculate. Face with the usual silvery appressed pile. General structure, wings, etc., as in *quadrinotatus*, but the third submarginal cell is much less produced at its apex, and the third at its base, than in *quadrinotatus*, this character, however, being liable to variation. The anterior tarsi present numerous gray spatulate hairs. The apex of the abdomen is of the same type as in *quadrinotatus*.

♂. Length, 8 mm. Black with white markings; the legs, the first segment of the abdomen, the second and sometimes the third more or less dorsally, the sides of the prothorax and greater part of metathorax sometimes, dark rufous. Markings as in ♀, except that the clypeus is yellowish-white, the anterior and middle femora have a white subapical patch behind, the abdomen above has five continuous bands, the second and third sometimes narrowly interrupted, the venter has three white bands, interrupted in the middle. Apex of abdomen pointed. Scape dark rufous with a pale yellowish ring. Face densely covered with silvery pile. Clypeus (if the light portion wholly coincides with it) very low and broad, with a median lobe extending upwards; it is probable, however, that the sides of the clypeus above are dark. Anterior margin of clypeus with three very distinct, but small, teeth. A brush of yellowish hairs in front of each mandible at its base. Mandibles rufous, with a light spot at base, simple. Punctuation of vertex much closer than in *taurus*. Nervures and stigma piceous or black.

Hab.—Several of both sexes, Rincon, New Mexico, July 5, visiting the flowers of *Chilopsis saligna*, Don. (Bignoniaceæ), in the river bed. One *A. taurus* was taken with them.

I am convinced that these are the sexes of one species, but the ♂ and ♀ would come at opposite ends of Mr. Dunning's table (CAN. ENT., XXVIII., 206). The males known from North America, with three teeth on the anterior edge of the clypeus, may be separated thus:—

- (1.) Ground colour rufous. *utahensis*, Baker.
- (2.) Ground colour black.
 - (a.) Head and thorax densely hairy. . . *hispidus*, Fox (L. Cala.).
 - (b.) Head and thorax not unusually hairy. . . *concinnullus*, Ckll.

The female of *concinnullus* is smaller than *quadrinotatus*, and has not the black head and thorax.

NEW COCCIDÆ FROM MASSACHUSETTS AND NEW MEXICO.

BY T. D. A. COCKERELL, MESILLA, N. M.

In Europe and in New Zealand species of the genus *Rippersia* have been found, which lived in the nests of certain ants. It had always seemed to me singular that nothing of the kind should occur in this country; but Mr. G. B. King has proved that they merely wanted looking for, his researches in Massachusetts having led to the discovery of three species, here briefly described.

(1.) *Rippersia Kingii*, n. sp.—♀. About $1\frac{1}{2}$ mm. long, oval, legs and antennæ very pale yellowish; the natural colour of the insect could not be determined from the alcoholic specimens, but Mr. King states that when alive it is pink, shading into purple. Mentum (so-called) elongate, dimerous, with four bristles in a group at each side near the tip, and two on the sides further up, at considerable intervals. Antennæ fairly stout, 6-jointed: 6 much longest, and about as long as 3, 4 and 5 together. Formula 6 (21) (534). All with very sparse whorls of hairs. 6 with 3 whorls. Femur stout, with four bristles on its outer margin. Tibia a little shorter than femur, with four long bristles on outer margin and two on inner. Tarsus distinctly longer than tibia. Claw very long, sharp, not much curved. Digitules very inconspicuous, filiform, with very minute knobs. Anal ring with 6 moderately small hairs. Caudal tubercles low, scarcely developed, with several hairs like those of the anal ring. Dermis with very few short hairs. Antennæ about as far apart as the length of a femur.

Hab.—Dracot, Mass., April 14, 1896, with *Lasius flavus*, L., very abundant [G. B. King]. From the character of the legs, I think these specimens are only of the second stage, but in any event the species

seems quite distinct. Another lot, also from Dracot, April 20, 1895, "with *Lasius claviger*, Rog., and *L. flavus*, very common," presents no structural differences, though Mr. King gives the colour when alive as purple. A third lot, "with *Lasius claviger* and *L. flavus*, Lawrence, Mass., April 10, 1894, colour purple," also agrees with *R. Kingii*; but one specimen of this lot has the antennal formula 631 (245), 6 with only two whorls of hairs, and may represent another species. Another has the formula 63 (21) (54).

(2.) *Ripersia lasii*, n. sp.—♀. Small, elongate-oval, clear white when alive (as I learn from Mr. King); legs ordinary, rather slender; tibia slender at base, almost as long as femur, but only about half as thick; tarsus about two-thirds length of tibia; claw rather long, pointed, slender; tibia and tarsus each with three short bristles on inner side. Trochanteric bristle not very long. Mentum dimerous, three hairs on each side near tip. Digitules apparently absent. Antennæ 7-jointed: 7 longest, longer than 5+6, but not quite as long as 4+5+6; 2 next longest; 3, 4 and 6 subequal; 5 shortest, a very little broader than long. Joints with very sparse whorls of hairs: 7 with three whorls, 7 a little constricted about the beginning of its apical third. Another specimen has only 6-jointed antennæ, varying thus like the European *R. pulveraria*: 3 is almost as long as 6. Formula 6 (31) 254. Four is as broad as long. As in *pulveraria*, the third joint divides to make the 7 joints. The joints are more constricted at the sutures than in *pulveraria* as figured by Newstead.

From *R. Kingii* it differs by the narrower third joint of antennæ, the somewhat less tapering apical joint, the more slender tibia and tarsus, the tarsus less tapering to claw, the claw less curved, femur not so stout, tarsal hairs shorter, stronger, not so curved, mentum shorter in proportion to its length, legs rather brownish than yellowish.

Hab.—Methuen, Mass., June 17, 1896, with *Lasius americanus*, Em., not common [G. B. King]. Another lot is marked by Mr. King, "with *Lasius flavus*, L., Methuen, Mass., Oct. 10, 1894, colour clear white, not very common." This is, I think, certainly the second stage of *R. lasii*, and may be described thus: Very slightly over 1 mm. long, rather elongate-cylindrical, though not excessively so; legs quite large; femur fairly stout, but not so stout as in adult; tibiæ somewhat shorter than tarsi. Antennæ 6-jointed: 6 about as long as 3+4+5, but not so long as in the adult. Formula 63 (21) (54). This second stage may be

known from *Kingii* by the third joint of the antennæ being distinctly longer than the second, as well as by the quite different colour when alive.

(3.) *Ripersia flaveola*, n. sp.—♀. Rather slender, about $1\frac{1}{2}$ mm. long, colour about a light French yellow when alive (Mr. King informs me); antennæ slender, 6-jointed: 6 longest, a little longer than $4 + 5$; 2, 3 and 4 subequal, 4 a little the shorter, but quite remarkably long, fully twice as long as broad; 1 next longest, then 5, which is a third longer than broad; 3 has a deep constriction at its distal third, so that it looks as if there were 7 joints, with a very small 4th, broader than long; 6 with three whorls of hairs. Legs slender, except femur, which is fairly stout. Tibia about as long as femur, tarsus about two-thirds length of tibia. Claw rather long, fairly stout, not much curved, with a small sub-basal tubercle on its inner side. Digitules apparently wanting. Mentum rather short, ordinary.

Another shows 7-jointed antennæ: 4 dividing into two, so we have 4, 5 and 6 all short and equal, or about so, 5 a little the shorter. This differs from 7-jointed *R. lasii* in being longer and slenderer, the sutures between the joints nearly flat for the most part, 6 much narrower, 2 and 3 longer, especially 2, which is at least twice as long as broad.

Hab.—Methuen, Mass., April 18, 1896, with *Lasius claviger*, Rog., not common [G. B. King]. Differs at once from *R. Tomlinii* by the antennæ; it is smaller than *R. corynephari*.

(4.) *Dactylopius prosopidis*, n. sp.—♀. Oval, about 2 mm. long, pale gray, varying to dark slate-gray and pale brownish-gray, with a sparse mealy covering, which is most dense along back and at sides, leaving fairly well-defined broad subdorsal bands of a somewhat darker colour, due not to pigment, but to the exposure of the body. No caudal or lateral cottony filaments, except in half-grown individuals, which show six short cottony caudal tufts.

The females live in subspherical masses on the twigs, after the fashion of *D. filamentosus*, and are attended by ants. The ♀ forms a dense cushion of white cottony matter, on which it rests; this cushion is visible all round the margin of the insect, and does not at first protrude greatly behind. In it are laid the very pale greenish-yellow eggs. Eventually the females become dark slate-gray, and have a cross of white secretion on the hind end. They at this period possess a Pulvinaria-like ovisac, projecting behind about as much as the length of a ♀, but thick, its height at the hind extremity of the ♀ being probably not less than the length of the ♀.

Boiled in caustic soda, they stain the fluid cochineal-red, and turn orange. Anal ring with the usual 6 hairs. Caudal tubercles very low, subobsolete, with setæ which are about twice as long as the hairs of the anal ring in the second stage, but not so long as this in the adult. Antennæ 8-jointed : 8 much longest, as long as $5 + 6 + 7$, which are subequal, but 5 the shorter ; 4 shortest, broader than long ; 3 and 2 equal. Formula 8 (32) 7 (61) 54. Legs ordinary, tarsus about $\frac{5}{8}$ to $\frac{3}{4}$ length of tibia, claw fairly large, digitules filiform, hardly knobbed.

Hab.—In the town of Mesilla, N. M., on Mesquite (*Prosopis*). I was astonished to come across this on some bushes I had passed many times. I have never seen it before on the numbers of Mesquite bushes I have examined in the vicinity. The eggs are produced at the latter part of July. This insect, in structure, particularly in the antennæ, closely resembles *D. solani*, var. *atriplicis*, which is probably a distinct species. Perhaps *prosopidis* and *atriplicis* may be forms of one species, but they seem distinct.

(5.) *Pulvinaria amygdali*, n. sp.—♀. Ochraceous, much wrinkled in drying ; length of a boiled specimen under cover-glass hardly $2\frac{1}{2}$ mm., broad oval. Ovisac about 7 mm. long, pure white, convex, like that of *P. ribesiae*, not parallel-sided like *camellicola*, etc., nor adherent to anything that touches it, like *maclurae*, *innumerabilis*, etc.

Antennæ 8-jointed : 3 much longest, then 4, then 8 almost as long, 2 very little longer than 5 ; 6 and 7 subequal and shortest, 6 a little the shorter ; 5 with two long bristles ; 2 with a long hair at its end. Trochanter with a very long hair. Femur stout, more than twice as broad as tibia, with an erect hair on its inner side near the middle. Tibia and tarsus slender, tibia about as long as femur, tarsus hardly half as long as tibia. Claw short and curved, sharp. Tarsal digitules slender ; those of claw tolerably stout, with oblique knobs, extending considerably beyond tip of claw. Marginal spines simple, slender, not numerous.

Prof. Tinsley, who was looking over the material with me, observed a specimen in which the third and fourth antennal joints were about equal.

Hab.—Abundant on a peach tree in Mr. Stanley's garden at Pinos Altos, N. M. (over 7,000 ft. alt.) ; found only on one tree. The antennæ are much like those of *P. persicæ*, Newst., but *amygdali* has the eighth joint decidedly longer. The knobs of the claw-digitules are larger and more oblique than in *persicæ*, and our insect is much smaller than Newstead's. The affinity of *amygdali* is clearly with *P. ribesiae*, Sign.,

but I have specimens of that, and it is clearly a different thing; the scale is dark-coloured. I do not suppose that *P. amygdali* was introduced into Pinos Altos on trees, but rather that it lives on some rosaceous shrub or tree in the mountains adjacent and has been carried to the peach tree on the feet of birds. This idea is favoured by the observation that it suffers severely from a Chalcidid parasite. The insect was discovered on July 8, 1896.

(6.) *Aulacaspis montanus*, n. sp.—♀. Scale circular to slightly oval, slightly convex, white, exuviae exposed, rather large, pale straw-yellow, first skin on second, but to its side. Diameter of scale little over 1 mm.

♀. When dry, brown-black, colourless after boiling in caustic soda. Mouthparts far anterior. Five groups of ventral glands, caudolateral and median groups compact, caudolaterals of 8, cephalolaterals 13, median 7. Median lobes wide apart at base, rounded, very low, their height above the margin less than half their breadth, their bases pointed, their colour slightly yellowish, not dark. Second and third lobes small, rounded, nearly obsolete. Plates small, spinelike. Anal orifice some distance from hind end, but caudad of the level of the caudolateral grouped glands. Margin with narrow sacs or saclike incisions, about as long as the greatest breadth of a median lobe.

♂. Scales in colonies, much as in *A. texensis*, brownish-white, distinctly 3-carinate, exuviae at one end, pale orange.

Hab.—Pinos Altos, N. M., July 8, 1896, on the trunk and limbs of *Quercus Wrightii*. It is evidently nearest to *A. texensis*, which lives on *Sophora* in Texas, but the median lobes are differently shaped and do not show the prominent serrations. The ♂ scales are not so white and have sharper keels than in *texensis*, but the ♀ scales are whiter and have the exuviae more contrasting with the scale.

I found four species of Coccidæ on the *Quercus Wrightii* at Pinos Altos, namely: *Aulacaspis montanus*, n. sp.; *Aspidiotus ancylus*, Putnam (evidently native); *Kermes galliformis*, Riley; and *Olliffiella cristicola*, Ckll., ined. The last is an extraordinary gall-making species, the type of a new genus of Idiococcinæ, the larva resembling *Crocido-cysta*; the adult, *Sphærococcus*—Australian insects! The galls were abundant on the leaves.

I found at Pinos Altos two other species of oaks (*Q. Gambelii* and *Q. hypoleuca*), kindly identified for me by Mr. C. A. Keffer, but on neither of them did I observe any Coccidæ. Pinos Altos is the only locality in the Rocky Mountains where I have seen as many as three species of oaks growing on one hillside.

A SUMMARY OF THE MEMBERS OF THE GENUS
CHILOSIA, MEIG., IN NORTH AMERICA, WITH
DESCRIPTIONS OF NEW SPECIES.

BY W. D. HUNTER, ASSISTANT IN ENTOMOLOGY, UNIVERSITY OF NEBRASKA.

Chilosia signatiseta, n. sp.

Eyes bare, arista plumose, scutellum with long hairs on the margin, third antennal joint very large, bright yellowish-red. Legs black.

Male.—Front prominent, opaque, strongly sulcate medially, very indistinctly punctulate, long black pilose. Face shining black, pollinose on the sides and pilose on orbital margin below; below the antennæ deeply concave to the tip of the tubercle, thence gently concave to the epistoma. Tubercle projecting somewhat beyond the base of the third antennal joint, round. Cheeks shining, sparsely whitish pilose. Ocellar area black pilose. Eyes metallic. First antennal joint black, second dark reddish-brown, third bright yellowish-red, very large, subquadrate, with the lower outer corner rounded, upper corner obtusely pointed. Arista basal, black, incrassate, densely plumose. Dorsum of the thorax very lightly punctate, shining greenish-black, abundantly whitish pilose (viewed from in front) mixed with black in the middle, longer posteriorly. Scutellum lightly punctate, abundant long black pilose, with a few light hairs intermixed. Pleura abundant long whitish pilose. Abdomen with the sides almost parallel, short sparse yellowish pilose, more abundant on the sides, where it is intermixed with a few black hairs. First segment entirely opaque, second and third except on the lateral margins, fourth entirely, bright shining greenish. Legs black, all the knees reddish; pile in most reflections black; on the under side of all the tarsi and the anterior tibiæ, golden in some reflections. Wings hyaline, veins dark brown, apical cross-vein almost straight, without stump. Length, $7\frac{1}{2}$ mm. Al., 7 mm.; 1 4-5 mm. wide.

Female.—Differs from the male in having the front shining and lighter pilose, the dorsum shorter pilose, the abdomen entirely shining, and the third antennal joint much larger; in this sex it is enormous—one and one-half times as large as in the male, but of the same shape.

Three specimens; Moscow, Idaho; Prof. J. M. Aldrich.

This species is closely allied to *C. Willistoni*, but is specifically quite distinct in the larger size and different shape of the third antennal joint, in the fact that the arista is densely plumose, while in that species it is loosely so, and that in the male the abdomen is largely opaque.

The third joint of the antennæ in *C. Willistoni* is small, subquadrate, and very much rounded at the tip; in the present it is very large, subquadrate, and obtusely pointed at the tip.

Chilosia cyanea, n. sp.

Eyes bare, arista plumose, scutellum with bristles on the margin, third antennal joint subquadrate, a little longer than broad, bright reddish-yellow. Legs black.

Female.—Shining blue. Front slightly sulcate medially, shining black, distinctly punctate, black pilose. Face shining black, not pilose, almost imperceptibly pollinose, deeply concave below the antennæ (so that in profile the concavity recedes to the eyes), tubercle rounded, obtuse, projecting about as far as the middle of the third antennal joint, below the tubercle almost straight (so that a line from the apex of the antennal callosity parallel to the posterior eye margin would coincide with the outline of the face below the tubercle). Cheeks shining black, nearly bare. First and second antennal joints black, second reddish at the apex. Third joint of medium size, a trifle longer than wide, subquadrate, with the lower outer angle rounded, light reddish-yellow, light pollinose in some reflections. Arista at the extreme base of the joint black, incrassate for about one-half of its length, long loose plumose. Occiput olivaceous, lightly pollinose, superiorly black and inferiorly white pilose. Thorax shining blue, finely punctate in front, more coarsely so posteriorly and on the scutellum, with very short black pile, lengthened into slender bristles on the sides posteriorly and on the border of the scutellum. Scutellum entirely shining blue, its pile and that of the adjacent dorsum yellow (viewed from in front). Pleura shining, with light-coloured pile. Abdomen broadly ovate, widest at the apex of the second segment, everywhere shining blue, less strongly punctured than the scutellum, with short white pile that when viewed from above appears to form narrow oblique bands, meeting at the middle of the anterior margin of the segments. Tarsi and legs, except the knees, black. Wings hyaline, much longer than the abdomen, tegulæ and veins testaceous. Posterior cross-vein slightly incurved, apical cross-vein straight, with outward stump at base and about one-third of its length above. Length, $7\frac{1}{2}$ mm. Al., 8 mm.

One specimen; Moscow, Idaho; Prof. J. M. Aldrich.

This species is closely related to *C. Willistoni*, but may be separated from that species by the general colour and by the colour of the third antennal joint.

Chilosia Aldrichi, n. sp. (Named after Prof. J. M. Aldrich.)

Eyes bare, arista scarcely pubescent, scutellum without bristles, legs black.

Female.—Shining black, almost bare. Front trisulcate, coarsely punctate, yellow pilose. Face shining on middle portion, powdered on the sides, between the lateral sutures and the eyes short pilose, below the antennæ deeply concave, below the tubercle slightly so. Tubercle round, projecting as far as the apex of the third antennal joint. Cheeks shining black, white pilose. Occiput shining olivaceous, light pilose. Ocellar area with a few black hairs. Antennal joints one and two black, third flattened, oval, slightly longer than broad, reddish-brown, darker above. Arista basal, almost bare, black, somewhat incrassate at base. Dorsum shining black, lightly punctate, very sparsely short yellow pilose, humeri dark. Pleura shining, pilose like the dorsum. Scutellum black, shining, more strongly punctate than the dorsum. Abdomen oval, widest at the apex of the second segment, everywhere shining black; black pubescent in the middle, and short white pilose at the sides anteriorly. Legs black; front pairs, including the coxæ on the under side and posterior tarsi at apex, very indistinctly golden pubescent. Wings subhyaline, indistinctly tinged on the basal half with brownish, long, rather slender, veins brown. Apical cross-vein without stump, except at the base. Tegulæ white. Length, 9 mm. Al., 8 mm.

Three specimens; Craig's Mt., Idaho; Prof. J. M. Aldrich.

The colour of the third antennal joint in this species varies from very dark reddish to almost black.

TABLE OF NORTH AMERICAN SPECIES OF CHILOSIA.

1. Eyes pilose.....	2
Eyes bare.....	8
2. Legs black.....	<i>Aldrichi</i> , n. sp.
At least the tibiæ more or less light-coloured.....	3
3. Third joint of the antennæ light reddish-yellow or yellow.....	4
Third joint of the antennæ black or reddish-brown.....	5
4. Abdomen shining (female), arista black.....	25
Abdomen largely opaque (female), arista brown.....	28
5. Third antennal joint nearly square.....	6
Third antennal joint rounded.....	7
6. Face in profile almost vertical below the antennæ, produced considerably below the eyes.....	<i>lasiophthalma</i> .

- Face strongly concave below the antennæ.....*Baroni*.
7. Shining portion of the abdomen steel-blue; pile of the front light-coloured.....*chalybescens*.
Shining portion of the abdomen metallic-green; pile of front black.....*occidentalis*.
8. Legs black; at most, the knees lighter.....9
Tibiæ at least largely yellow.....14
9. Third antennal joint black.....27
Third antennal joint brown, yellow or reddish-yellow.....10
10. Arista plumose.....11
Arista bare.....13
11. Third antennal joint reddish-brown; arista loosely plumose; general colour blackish; antennæ moderate in size (female)....*Willistoni*.
Third antennal joint bright reddish-yellow.....12
12. Arista densely plumose; general colour blackish; dorsum of thorax (female) yellowish pilose; third antennal joint very large (female).....*signatiseta*, n. sp.
Arista loosely plumose; general colour blue; dorsum of the thorax (female) not black pilose, but black pubescent (viewed from in front).....*cyanea*, n. sp.
13. Third antennal joint reddish-brown or brown; rounded; tegulæ black ciliate; wings blackish in front.....*nigripennis*.
Third antennal joint reddish-yellow, subquadrate; tegulæ white ciliate; wings not blackish in front.....*versipellis*.
14. Scutellum without bristles or bristlelike hairs on the margin.....15
Scutellum with bristles or bristlelike hairs on the margin.....18
15. Posterior femora largely reddish, or at least so coloured at the base.....23
Posterior femora, except the tip, always black.....16
16. Abdomen entirely shining in both sexes.....*comosa*.
Abdomen, at least in the male, largely opaque.....17
17. Four anterior tibiæ entirely yellow; pile of front light-coloured.....*capillata*.
Four anterior tibiæ yellow only at apex and base; pile of front black.....*tarda*.
18. Arista briefly pubescent.....19
Arista plumose or long pilose.....20
19. Femora yellow.....*prima*.
Femora largely black or brown.....24

20. Third antennal joint quadrangular..... *Townsendi*.
 Third antennal joint rounded-ovate or ovate..... 21
21. Abdomen in both sexes entirely shining..... 26
 Abdomen of the male largely opaque..... 22
22. Posterior femora on basal third, and at apex, yellow; scutellum
 yellow, except the narrow base..... *pallipes*.
 Posterior femora, except the apex, black; scutellum only piceous at
 apex; first posterior cell broader and last section of fourth longi-
 tudinal vein accordingly longer..... *tristis*.
23. Second abdominal segment partly opaque; four anterior tibiæ
 entirely yellow..... *prima*.
 Abdomen entirely shining; four anterior tibiæ with at least a dark
 band..... *parva*.
24. Pile of dorsum of thorax black, abundant..... *sorocula*.
 Pile of dorsum of thorax sparse, whitish or yellowish..... 29
25. Thorax long pilose, third antennal joint moderate; arista
 pubescent..... *aurotecta*.
 Thorax short pilose..... 27
26. Anterior femora largely black..... *cyaneascens*.
 Anterior femora yellow..... *plumata*.
27. Scutellum with bristlelike hairs..... *lævis*.
 Scutellum destitute of such hairs..... *lucta*.
28. Scutellum with bristles..... *petulca*.
 Scutellum without bristles..... *sororia*.
29. Pile of the abdomen long, yellow..... *chalybescens*.
 Pile of the abdomen short..... *hoodiensis*.
30. Posterior femora light-coloured at base and apex; dorsum of thorax
 smooth..... *pallipes*.
 Posterior femora light-coloured only at the apex; dorsum of thorax
 roughened..... *leucoparea*.

CATALOGUE OF THE DESCRIBED NORTH AMERICAN SPECIES OF CHILOSIA.

Chilosia.

Meigen; Syst. Besch. III., 296 (1822), *Cheilosia*.

Ibid., id., VII., 123 (1838).

Cartosyrphus, Bigot, Ann. Soc. Ent. Fr., 1883; 555. (Will.)

Melanogaster, Bigot, Ann. Soc. Ent. Fr., 1883; 258. (Pt.)

Syrphus and *Eristalis* ex parte, auctorum.

- Chilosia Aldrichi*, Hunter ante.
- Chilosia aurotecta*, Giglio-Tos ; *Bulletino Mus. Zool. e. Anat. R. Univer.*, Torino ; Vol. VII., 132, p. 4. (1892). Orizaba, Mexico.
- Chilosia Baroni*, Willist., *Syn. N. A. Syrph.* 40. (1886). Cala., Washington State.
- Chilosia capillata*, Loew, *Centur. IV.*, 65, 1863.—O. S. Cat. N. A. Dipt., 1878, p. 121 ; *Will. Syn. N. A. Syrph.* 43. D. C.—Virginia. *Cartosyrphus lamprurus*, Bigot, *Ann. Soc. Ent. Fr.*, 1884, 552 (Will.)
- Chilosia chalybescens*, Will., *Kans. Uni.*, *Quart. Vol. II.*, No. 2, 1893. Cala.
- Chilosia chrysochlamys*, Will., *Biol. Cent. Am. Dipt.*, III., p. 8 (1891). Omilteme, Mexico, and Sierra de las Aguas Escondidas, Mex.
- Chilosia comosa*, Loew, *Cent. IV.*, 66, 1863.—O. S. Cat., 1878, 121., Will. *Syn. N. A. Syrph.* 44. Colo., English River; Winnipeg.
- Chilosia cyanea*, Hunter ante. Idaho.
- Chilosia cyanescens*, Loew, *Cent. IV.*, 66, 1863.—O. S. Cat., 1878, 121. Will. *Syn. N. A. Syrph.* 42. Conn.; New Hampshire ; Illinois.
- Chilosia hoodiensis*, Bigot, *Ann. Soc. Ent. Fr.*, 1884, 552 (*Cartosyrphus hoodianus*). Will. *Syn. N. A. Syrph. Appendix*, 292. Oregon.
- Chilosia lævis*, Bigot, *Ann. Soc. Ent. Fr.*, 1883, 552 (*Cartosyrphus*). Will. *Syn. N. A. Syrph. Ap.* 292. Washington State.
- Chilosia lasiophthalma*, Will., *Proc. Am. Phil. Soc. XX*, 306, 1882. *Ibid. Synopsis*, 40, 1886. Colorado.
- Chilosia leucoparea*, Loew, *Cent. IV.*, 69 —O. S. Cat. N. A. Dipt., 1878, 121 ; Will. *Syn. N. A. Syrphidæ*, 45. Carolina.
- Chilosia lucta*, Snow, *Kans. Uni.*; *Quart. Vol. III.*, 228, April, 1895. Colorado.
- Chilosia nigripennis*, Will., *Proc. Am. Phil. Soc. XX.*, 307 ; 1882. Oregon. *Cartosyrphus infumatus*, Bigot, *Ann. Soc. Ent. Fr.*, 1884, 553.
- Chilosia occidentalis*, Will., *Proc. Am. Phil. Soc. XX.*, 305. *Ibid. Synopsis*, 41. California.
- Chilosia pallipes*, Loew, *Cent. IV.*, 70, 1863.—O. S. Cat. N. A. Dipt., 1878, 121. Will. *Synopsis*, 41, *Ib. Appendix*, 293. White Mts.; Washington, Cala.
- Chilosia parva*, Will., *Proc. Am. Phil. Soc. XX.*, 307 ; 1883. Oregon. *Melanogaster ochripes*, Bigot, *Ann. Soc. Ent. Fr.*, 1884, 555. (Will.)
- Chilosia petulca*, Will., *Synopsis* 39, 1886. Snow, *Kans. Uni.*, *Quart. Vol. III.*, 228. State of Washington ; Colorado.

- Chilosia plumata*, Loew, Cent. IV., 68, 1863.—O. S. Cat. N. A. Dipt., 1878, 121. Will. Synopsis, 42, 1886. Virginia.
- Chilosia prima*, Hunter, CAN. ENT. XXVIII., 92, 1896. Pennsylvania.
- Chilosia signatiseta*, Hunter ante. Idaho.
- Chilosia sorocula*, Will., Biol. Cent. Am. Dipt. III., 1891. Snow, Kans. Uni., Quart. III., 228. Mexico: Omilteme, 8,000 feet; Xucumanatlan, 7,000 feet; Sierra de las Aguas Escondidas, 7,000 feet;—all in Guerrero, U. S., New Mexico.
- Chilosia sororia*, Will., Biol. Cent. Am. Dipt. III., 9, 1891. Mexico. Ciudad in Durango, 8,100 feet.
- Chilosia tarda*, Snow, Kans. Uni., Quart. Vol. III., 228. Colorado.
- Chilosia Townsendi*, Hunter, CAN. ENT., Vol. XXVIII., 94, 1896. California. *Chilosia* sp., ? Townsend, Dipt. Baja, Cala., in Proc. Cala. Acad. Sci. Series ii., Vol. 4, 611.
- Chilosia tristis*, Loew, Cent. IV., 71, 1863.—O. S. Cat. N. A. Dipt., 1878, 121. Will. Synopsis, 41. Red River. (Loew.)
- Chilosia versipellis*, Will., Synopsis 44. State of Washington.
- Chilosia Willistoni*, Snow, Kans. Uni., Quart. Vol. III., 227 (1895). Cala.; Col. This species was described as *C. lugubris* by Williston—Synopsis, p. 45, 1886. Snow has suggested the present name because "the name *lugubris* is preoccupied for a Swedish *Chilosia* by Zetterstedt." According to Herr T. H. Becker, Zetterstedt's species will not stand, as the types of that species are partly teneral forms of a well-known species of Meigen and partly mature specimens of other species. However, this does not affect the propriety of Mr. Snow's suggestion which I have adopted.

SPECIES NOT INCLUDED ABOVE.

- Chilosia frontosa*, Bigot, Ann. Soc. Ent. Fr., 1883, 552. Will. Synopsis, p. 46. Mexico.
- Chilosia rufipes*, Bigot, Ann. Soc. Ent. Fr., 1884, 555 (*Melanogaster*).

It is quite probable that this species is a *Chilosia*, from the fact that Mr. Bigot, in his table for the separation of the genera of Syrphidæ, distinguishes *Melanogaster* from *Cartosyrphus* by the fact that in the former genus, "Face, female, pourvue de sillons lateraux."

It will be impossible to recognize the species from the description, as the three very important characters—the bareness or pilosity of the eyes and arista, and the presence or absence of bristles on the scutellum—are entirely omitted.—North America (Bigot).

- Chilosia*, n. sp. ? Snow, Kans. Uni., Quart. Vol. III., 229. Colorado.

A NEW PULEX FROM QUEEN CHARLOTTE ISLANDS.

C. F. BAKER, FORT COLLINS, COLO.

Pulex Keeni, n. sp.

Belonging to Division II., group two of the genus as given in my Preliminary Studies. Nearest *sciurorum*.

Head without combs of spines, in the female normal, highest at the occiput, gradually sloping forward, then rapidly curved in front, anterior edge of face nearly perpendicular, but rounded; head in male flat above or slightly concave, strongly rounded in front, the anterior edge of the face slightly receding. Bristles on head few, these being on both sides of the antennal groove and on the occiput. Antennal groove open, bristles on joint 2 short. Mandibles equalling or slightly exceeding the fore coxæ. Pronotal comb of twenty-two spines. Bristles on dorsal abdominal segments in two rows, the second of six to ten rather short bristles, on the ventral segments in single rows of usually six bristles. First three or four dorsal segments furnished on discs with two to six very short stout teeth. Leg spines rather weak except on the fore coxæ and all the tibiæ. Apical spines on joint 2 of hind tarsi much shorter than joint 3; two of the apical spines of middle tibiæ longer than first joint of tarsi. In fore tarsi joint 1 equals 2 and three-fourths of 5, 3 a little shorter than 5, and 4 little more than half of 5. In the middle tarsi joint 5 equals three-fourths of 2, 3 is one-half of 1 and nearly equals 5, and 5 is twice 4. In the hind tarsi joint 2 is two-thirds of 1, 1 is two and a half times 3, 2 equals 3 and 4 together, while 4 is one-half of 3, which is somewhat longer than 5. In the male the upper claspers are long, narrow, pedunculate, sides nearly parallel, anterior margin slightly angulated, apex rectangular and furnished at tip behind with a long, stout bristle, and on posterior edge with two short, stout, blunt black spines; the lower or posterior claspers differ widely from those of *sciurorum* in being short and suddenly broadened towards the tip. Colour light brown. Length: male, 2.5; female, 3 mm.

Described from several specimens taken on *Sitomys Keeni*, at Masset, Queen Charlotte Islands, in August of 1895, by Rev. J. H. Keen, to whom the species is dedicated. I am indebted to Dr. James Fletcher for the opportunity of examining this very interesting and well-marked form.

NOTES ON SAWFLY LARVÆ.

BY HARRISON G. DYAR, PH. D., NEW YORK.

Trichiosoma triangulum, Kirby.

Two flies have emerged from cocoons which had passed two winters. Last summer I noticed an example of mistaken instinct. The eggs of this species are laid under the lower epidermis by saw-cuts in the edge of the leaf. Several eggs so laid were found on *Ilex verticillata*. In due time the larvæ hatched, but refused their food, and would undoubtedly have perished had I not recognized them and supplied them with willow, which they attacked voraciously.

Macrophya tibiator, Norton.

The description of the larva of this species in Harris's Correspondence, p. 369, is included in the first paragraph only. The remaining notes under the same heading refer to larvæ of *Harpiphorus varianus*.

M. tibiator has a variable number of stages, difficult to determine, much as in the case of *H. varianus*. I have mature larvæ with width of head 1.4, 2.2 or 2.5 mm. The following description is a little more definite than that of Harris, though his is excellent:—

Pale yellowish, thickly overspread with a fine mealy-white secretion, less abundant subventrally and on the legs, which consequently appear yellowish; venter without bloom; anal plate concolorous. On vertex of head a large defined black band ending in a rounded point above the clypeus; eye in a black spot. Segments 7-annulate; a row of small velvety black lateral spots, two per segment (on third and fifth annulets above the spiracle), the anterior spot the larger; only one spot on joints 3 and 4, none on joint 2, and only a trace of any on joint 13. Thoracic feet colourless, with a black mark at the extreme base. Abdominal feet on joints 6 to 13. The larvæ curl spirally like the *Cornus* larvæ. Sometimes the white secretion become slightly woolly, but never as in *H. varianus*. Head only slightly pruinose.

Ultimate stage.—Head shining, dull honey-yellow, finely shagreened, no marks; eye black. Body segments neatly 7-annulate, very shining, pale greenish-yellow, without marks or any white bloom except the dark spiracles and faint tar-brown shades in the folds. Thoracic feet colourless. The larvæ immediately enter the earth. Found on the elder (*Sambucus*) in VanCortlandt Park, New York, and also sent me by Mrs. Slosson, from Franconia, N. H.

Harpiphorus maculatus, Norton.

I think the last word has not been said in the controversy as to the identity of this form with *Monostegia ignota*. Mr. Mally apparently disposed of the question (Insect Life, III., 9) by showing that *M. ignota* had always four submarginal cells and came from a larva with immaculate head, whereas *H. maculatus* may have three or four submarginal cells, but comes from a larva with a black spotted head.

Now I have to record the breeding of two specimens of *H. maculatus* from larvæ with black spotted head (as required), but also two specimens of the same insect (three submarginal cells) from larvæ with immaculate head, on strawberry, and another specimen from a similar larva on raspberry.

These observations are contradictory to Mr. Mally's conclusions; but agree with the original contention of Mr. Harrington, that the species are identical. Another fact is in favour of Mr. Harrington's view. The larvæ of both forms are structurally and in habits those of *Harpiphorus* (or *Emphytus*), not *Monostegia*, *Eriocampa* or *Caliroa*. The two types are rather distinct.

Egg.—I have nothing to add to Mr. Mally's account.

Stage 1.—Head black or dark brown, with a black shade around the eye; width .25 to .3 mm. Body whitish, rather opaque, but the food showing by transparency; distinctly annulate, no marks. Thorax slightly enlarged. Rests with the body extended.

Stage 2.—Head pale brown, with or without traces of a vertical and lateral black patch; eye black; width .4 mm. Body all whitish, food showing; annulate, as before.

Stage 3.—Head pale brown or whitish-testaceous, shining, the eye black, immaculate or with the three black spots of the mature larva (black spotted variety); width .6 mm. Body whitish, not shining, about 6-annulate, no marks. The larva rests with the body curled.

Stage 4.—Head whitish to pale brown, as before; width .8 mm. Body whitish, like ground glass, only coloured by the food from within. Feet on joints 6 to 13; thorax a little larger than abdomen; head large in proportion.

Stage 5.—Head whitish or slightly brownish, immaculate, except for the black eye, with a trace of black shades or a dusky black cloud on the apex and a smoky darker patch behind and a little above the eye; width 1.0 to 1.15 mm. Body as in the next stage, but without the small points;

immaculate or with more or less distinct traces of a dusky lateral band ; rarely a faint black suranal dot.

Stage 6.—Head whitish, with a brown shade over the vertex, or pale brown, immaculate or with the three black patches ; eye black ; a groove at the vertex of each lobe ; width 1.3 to 1.5 mm. Thorax enlarged, mostly dorsally, the lateral outline regular ; segments neatly 6-annulate, with minute blunt white points on the second and fourth annulets. Whitish, not shining, a faint green tint dorsally. Thorax dark green from the large crop full of food ; posterior portion of alimentary canal nearly empty ; dorsal vessel greenish. No marks or a lateral smoky black band of segmentary dusky patches and traces of a geminal dusky dorsal shade. A small quadrate black suranal patch. Thoracic feet colourless, with brown tips ; tracheæ not very evident. Sits with the body outstretched or curled.

Stage 7 (ultimate stage*).—Head sordid whitish, vinous tinted or pale greenish, immaculate or with the spots represented by leaden or tar-brown shades ; width as before. Body the same colour, more or less shaded with tarry-brown in the folds and in an indistinct subdorsal shade.

Caliroa obsoleta, Nort. (CAN. ENT., XXVII., 338, 3S.)

Head very pale testaceous, eye black ; width .7 mm. Body colourless or very faintly greenish, food showing distinctly. Skin shining and sticky ; feet on joints 6 to 12, all colourless, including the thoracic feet. Thorax enlarged, the feet truncate.

Ultimate stage.—Not shining, rather opaque pale whitish ochreous ; segments obscurely annulate, with transverse dorsal shining areas.

Feeds on wild cherry (*Prunus serotina* and *P. pennsylvanica*). Rests on the under side of the leaves, never on the upper ; solitary. The larva is smaller than *Eriocampa cerasi*, without any trace of the blackish colour.

The variation in the number of submarginal cells and in the colour of the head in the larva of *Harpiphorus maculatus* recalls the case of *Monostegia quercus-alba*. If we disregard the colour of the head here also, there are still three well-marked types of larvæ as follows :—

1. On white oak, rarely on black oak ; sides of the thorax concolorous with the body ; head colourless, pale brown or black. Imago, 16 speci-

* I propose this term for that final larval stage of certain sawflies in which they do not feed, but only seek for a place for pupation ; the colour is usually markedly different from the preceding stage, but the head has the same width.

mens: four with two middle cells in hind wings, five with one middle cell, and seven with no middle cells (five of the latter are males; all the rest females). Larva with the pale head described in Trans. Amer. Ent. Soc., 1867, and CAN. ENT., XXVII., 195, as *M. q.-albae*; with black head, described, CAN. ENT., XXVI., 43, and XXVII., 195 (the last time as *Caliroa obsoleta*).

2. On black oak, rarely on white oak and yellow birch; sides of thorax orange tinted; head whitish or black. Imago, nine specimens: seven with two middle cells in hind wings, at least on one side; two with one middle cell on both sides. Larva with pale head described, CAN. ENT., XXVI., 42, as *M. q.-coccineae*; with the black head, CAN. ENT., XXVII., 193, as *Eriocampa fasciata*.

3. On wild cherry, entirely pale, and never gregarious, as the two preceding generally are. Imago, four specimens with no middle cells in the hind wings. Larva described as *Caliroa obsoleta*.

Pristiphora grossulariae, Walsh.

Larvæ common on gooseberry at Jefferson, N. H. The four last stages were observed with widths of head .4, .6, .8, 1.2 mm. The segments are obscurely 6-annulate, with minute dark setæ on the second and fourth annulets, and on the subventral region; no anal prongs. Walsh's description is sufficient.

Pristiphora tibialis, Norton.

I have already described this larva on birch and willow. The occurrence on the latter food plant would seem to confirm Norton's original suggestion that the species is the same as *P. sycophanta*, Walsh, since the larvæ might have entered a deserted gall on their food plant when preparing to spin and thus be classed by Walsh as "inquiline." More recently I have bred *P. tibialis* on high bush huckleberry (*Vaccinium*) from near New York City. The following is a description of the single larva found on this plant: Abdominal feet on joints 6 to 11. Head pale testaceous greenish, a brown shade from the eye to the vertex and a darker one on the median suture, spreading out on the clypeus; width 1.3 mm. Body clear green, rather dark; dorsal vessel a distinct black band edged with a broad green stripe of fat-granules which fade away to near the lateral area, blending into the ground colour. On joint 13 a dorsal and subdorsal mass of fat, the end of the joint solidly filled in with the green fat. Segments rather distinctly 6-annulate; subventral

folds black dotted. Thoracic feet faintly brownish. The larva rests on the edge of the leaf, curling its body more or less downward.

Nematus dorsivittatus, Cresson.

Larvæ on poplar at Jefferson Highlands, N. H. Identical with *Nematus mendicus*, except in size; width of head 1.7 mm. The dark spottings on the head fail to separate these species, for in these most recent specimens of *N. dorsivittatus* they are about as distinct as in *N. mendicus*. The anal prongs pointed, black tipped. Larva described, Trans. Am. Ent. Soc., XKII., 303.

Cladius pectinicornis, Fouch. (= *isomera*, Harris.)

Larvæ on wild rose in VanCortlandt Park, N. Y. Five stages observed with width of head .3, .5, .7, 1.0, 1.4 mm. No ultimate stage. The larvæ are already adequately described.

AGRONOMA AGAIN.

BY JOHN B. SMITH, SC. D.

In 1895, according to Mr. A. R. Grote, "the European type of *Agronoma* seems certainly to be *vestigialis*." This species was declared to be congeneric with the American species classed by me as *Feltia*, and the latter genus was dropped in favor of *Agronoma*, and Mr. Slingerland was scolded because he had adopted the generic name used by me. In the January (1896) number of the CAN. ENT. I pointed out for Mr. Grote's benefit, and also for the information of American students, that there existed certain points of structural difference which had escaped Mr. Grote's examination, which made the declared type of *Agronoma* a member of the genus *Agrotis* as restricted by me, the latter genus being based upon the very species which Mr. Grote said was its type. As the result of this paper, it has become much less "certain" to Mr. Grote's mind that *vestigialis* is, after all, the type of *Agronoma*, and on reconsidering the matter, it seems to him that *crassa* had better be considered the type. Mr. Grote states, in the June number of the journal of the New York Entomological Society: "I have examined here, in the Roemer Museum, specimens of *crassa*. The fore tibiae are heavily armed; the front is roughened or tuberculate; the male antennæ are pectinate. It is therefore a *Feltia*". "It follows that the type of *Agronoma* must be changed, and *crassa*, the first species cited, is then the type." It is to be noted that Mr. Grote refers to the front as being "roughened or

tuberculate," and this at once made it more than reasonably doubtful whether his conclusion, "It is therefore a *Feltia*," was justified; because in *Feltia* the front is not tuberculate; it is roughened and protuberant only. A tuberculate front is the chief characteristic of Mr. Grote's genus *Carneades* and of my genus *Porosagrotis*. It became necessary, therefore, for me to examine specimens of *crassa*, and this again presented evidence of Mr. Grote's failure to make strictly accurate, scientific statements. The structure of *crassa*, with the exception of the pectinated antenna, is exactly the same as that of his genus *Carneades*, and it adds force to what I previously said, that Mr. Grote did not recognize the extent of his own genus when he described it. The pectinations of the antennæ in this group are not of generic value. *Feltia* contains some species that have antennæ pectinated, and some that have them serrated. Both *Porosagrotis* and *Carneades* contain species ranging in the same way, with either pectinated or serrated antennæ; but the essential point, the tuberculate clypeus or front is characteristic of Mr. Grote's genus *Carneades*, and this is exactly what he failed to recognize in the European species *crassa*. My genus *Porosagrotis* is the only one ever described by me which is based on genitalic characters. In *Carneades* the clasper is forked, or consists of two prongs. In *Porosagrotis* the clasper is single. Now, in *crassa* we have exactly the same structure that we find in *Porosagrotis*, and the species is rather closely allied in general appearance to what I have described as *dædalus*, and also to Mr. Grote's species, *texana*. If *crassa* is the type of *Agronoma*, *Agronoma* must replace *Porosagrotis*. If *Porosagrotis* is not a good genus, because based on genitalic characters, Mr. Grote's *Carneades* must sink in favour of Hübner's *Agronoma*. It does not make very much difference to me which conclusion is adopted. Mr. Grote expresses himself as much obliged to me for showing the necessity of changing the type of Hübner's genus. I am equally obliged to him for giving me another opportunity to show how little his statements as to structural characters can be trusted.

There is another point that may be mentioned here. Mr. Grote has several times referred to *Mamestra comis*, and has questioned the correctness of my reference of this form to *olivacea*. Most recently he questions the correctness of my identification of the type, and from descriptions refers *circumcincta* as the same as *comis*. I called attention, in speaking of *comis*, to the fact that the insect was peculiarly set and that it was a remarkably pretty specimen, and I may add that the

description is a very good one of the type seen by me. The peculiarity about the specimen is that it was very fresh when caught, and the wings, apparently, had not become entirely hardened. When placed upon the spreading-board they broke near the base and formed a little shoulder, such as almost every one who has ever spread insects has found himself compelled to deal with. The insect was well spread in other respects, and the little break of the wings was almost concealed by the heavy vestiture of the thorax. With its bright colours and the comparatively broad, short wings, produced by the imperfection just mentioned, the specimen has quite a distinctive appearance, and it was in seeking to locate just exactly what this distinction consisted of, that I might place the species into its proper place in a synoptic table, that I found that it did not differ in any respect from *olivacea*. I have in my collection at the present time a specimen which agrees in brightness of colour and general appearance with *comis*, but being fully matured and with the wings at full length, shows its relation to *olivacea* at a glance. I would again call attention to the extreme desirability of verifying Mr. Grote's statements before accepting them when they involve a change in nomenclature or in the synonymy.

ADDITIONS AND CORRECTIONS TO MY 1894 LIST OF
WINNIPEG BUTTERFLIES, WITH NOTES FOR
SEASON OF 1895.

A. W. HANHAM.

Argynnis cipris, Edw.—One specimen taken August 4th. Kindly identified by Mr. James Fletcher.

Phyciodes carlota, Reak.—One specimen. June, 1894.

Phyciodes, sp.—Five specimens taken June 17th to 24th, 1894, and recorded as *Nycteis* in error in my 1894 list.

Phyciodes nycteis, Db.—Hew.—June 30th to July 10th. Common in a new locality visited this year. Not taken in 1894.

Colias eurytheme, Bdv.

var. *eriphyle*, Edw.—August 4th, etc.

var. *keewaydin*, Edw.—August 4th, etc.

Colias philodice, Gdt.—This species may not occur here; *C. eriphyle*, Edw., being mistaken, most likely, for it.

Pamphila ottoe, Edw.—June 30th (a ♀), July 1st (a ♀ and a ♂). The male was lying with its wings expanded (as if at rest) on a flower head in a clearing; it was dead, however, but a fair specimen. Kindly identified by Dr. Hy. Skinner.

Amblyscirtes vialis, Edw.—One. June 30th.

Owing to a visit to England in the spring, I did no collecting here until nearly the end of June, consequently many of the early-occurring species were missed. On the 23rd June very few species were flying. "Blues" were plentiful; *Sepiolus* especially so, mostly ♀. Other species were: *Melissa* (only males), *Afra* (1), *Lucia* (1). "Skippers," only a *Cernes* and a worn *Pylades*. *Danaus archippus* and *Cæonympha inornata* complete the list.

From that date until the end of the season many visits were paid to the different favourite localities around the city, but "things," almost without exception, were scarce, and many of the species taken in 1894 were not met with. Not a single *Thecla* or *Papilio* was seen on the wing.

Phyciodes tharos, Dru.—Pupæ of this species were found on July 4th and 14th, attached to the palings of my back yard.

Pyrameis cardui, Linn., was very noticeable on the wing, in and around the city, at the end of June and early in July, and later the webs of its larvæ were thick among the thistle heads everywhere. Very few of these, I think, reached the "imago" state.

Cæonympha inornata, Edw.—Specimens of this butterfly taken June 23rd were mostly worn, but the species was met with as late as July 10th.

Lycæna melissa, Edw.—Captured or seen June 23rd, July 23rd, August 24th and 25th, and September 2nd. On August 25th I took my first and only ♀.

Thymelicus garita, Reak.—This species occurred in some abundance locally from June 30th to July 13th, but most of the specimens netted were poor.

Pamphila manitoba, Scud.—According to Dr. Skinner, my Winnipeg specimens are the var. *Assiniboia*, Lyman. I captured one this season (August 4th), and have yet to take my first ♀ here.

Mailed September 9th.

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SOME NOTES ON INSECT ENEMIES OF TREES.

BY A. D. HOPKINS, WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION.

The study of forest and shade tree insects is a line of entomological work demanding especial attention in the State of West Virginia. During the past two years I have carried out quite an elaborate line of investigations and experiments on this subject. The *first* object was to conduct investigations with reference to the forest conditions, the distribution of forest trees, and the relation of certain kinds of forest growth to the occurrence and range of the several life zones, and minor divisions of the same in the State. *Second*, to ascertain as far as possible the principal insect enemies of forest growth and their habits, as well as to study the climatic and other conditions that might be favourable or unfavourable for their multiplication; or the extension of their depredations. *Third*, to determine by experiments and otherwise some improved and practical method of preventing the losses that are occasioned by the more destructive kinds, especially those caused by bark and wood infesting insects.

Sufficient evidence has been obtained in the first object to enable me to prepare a preliminary map of the forest divisions of the State and the probable range of the life zones. Considerable information has also been added with reference to the habits of some of the more destructive insects, and some results have been obtained towards successful methods of preventing serious losses from their attacks on felled timber.

The studies with reference to preventives and remedies include a line of experiments which has already given good results and promises better ones in the future. The experiments include the cutting of different kinds of trees twice a month, year after year, until sufficient evidence is obtained to enable me to arrive at some definite conclusions with reference to the proper times to cut timber to secure the least possible damage from insect attack.

This line of experiments has been carried on regularly in different sections of the State since April, 1895. Observations are made from

time to time during the year, and the condition of the wood and bark is noted, together with the kinds of insects occurring in the same, the character of injury, etc.

It was found necessary to have some convenient method of ascertaining what insects bred in the wood and bark of trees cut in each month. Therefore an insectary was planned and built with this end in view. At present it consists of a room 12 feet long by 9 feet wide and 9 feet high. It is divided into four compartments or rooms, each 3 feet wide and 9 feet long, with 12 breeding cages or boxes, 18 x 12 x 18 inches, in one end. A door opens into each room, and a window 12 x 12 inches above the suite of breeding boxes, near the ceiling, gives the necessary light. The breeding boxes are arranged like drawers, in a case with doors in each opening into the room, and with a 2-inch round window in the back, opposite to a correspondingly small window in the wall. The object of the small windows in the boxes and in the ends of the rooms is to attract the insects to the light when they emerge so that they can be easily collected. Each room is devoted to one kind of wood,—as pine, oak, and hickory. Pieces of the trunk and branches of an infested tree are placed on shelves on one side of the room, and as the insects emerge they fly to the window, where they are collected in a cyanide bottle provided for each room. A shelf is attached just beneath each window and is covered with white paper, so that if any of the smaller insects die, they fall on it and are easily found.

The twelve boxes in the end of each room are used to breed insects from the wood and bark of trees cut in each month of the year. This arrangement of rooms and boxes is proving quite successful. Hundreds of specimens have been obtained, representing many species which would have been difficult to obtain in any other way, and in addition, many important facts have been learned with reference to the food habits of certain species.

One of the most interesting results that has been obtained is from hickory and oak, cut in the winter and summer of 1894. That cut in the winter months is being converted into a powder by *Lyctus striatus*, while that cut during the summer months is but slightly damaged.

I have also found from the cuttings in the forest that the wood of certain species of trees felled during the winter months, as well as of those felled in the late fall and early spring, are seriously damaged by wood-boring insects, while those cut in July and August are either entirely exempt, or but slightly damaged.

FIRE WOUNDS THE PRIME CAUSE OF SERIOUS LOSS OF TIMBER.

In studying the forest conditions and the influences that contribute to the destruction of timber, I have found that a slight injury to the base of a tree by fire offers favourable conditions for the attack of insects, which result in the final destruction of the valuable wood of the tree. The fire burns and kills the bark at one side of the base of the tree, which in itself might not be a serious matter, since subsequent growth would heal it over, but it was found that these slight wounds are subsequently infested by Ptinid, Scolytid and Calandrid beetles and their larvæ; also by Cerambycid, Buprestid and Lepidopterous larvæ, which by their boring either convert the inner dead wood into a dry powder, or their mines give entrance to a "dry rot" fungus*, so that another forest fire finds in these extended wounds the conditions most favourable for a still further extension of the injury. Thus, frequent fires in the same forest may, by this process, burn entirely through the trunk of a large tree.

It was also found that these fire wounds are almost invariably followed by a decayed condition of the heartwood, which results finally in a hollow trunk. Previous observations led me to believe that insects were largely to blame for the destruction of the heartwood of living trees injured by fire and other causes. I therefore had a number of wounded trees felled on November 9th, 1895, and the trunks split open so that I could examine the causes and effects.

I found in nearly every tree thus examined that the rapid extension of the decay was due largely to Cerambycid, Lymexylon and Brenthid larvæ which had entered from eggs deposited in the edges of the fire wounds, and that brood after brood of these larvæ, aided by wood-infesting ants, had completely honeycombed the heartwood for a great distance above the wound. Thus the valuable heartwood was completely destroyed or rendered worthless. By persistent search I was fortunate enough to find in the heart of a chestnut tree the imago of one of the Cerambycid borers, where it had recently transformed within its pupa case. It was located near the heart of the tree, and about four feet and a half above the upper edge of the wound, and three feet above any decayed wood. This beetle was identified for me through the kindness of Mr. Howard, of the Division of Entomology, as *Centrodera bicolor*.

On May 19th, 1896, I cut another example of this species from a tulip log, at Pickens, W. Va., where I had previously discovered (June

* *Merulius lacrimans*.

20th, 1894) a Cerambycid larva, that was found to be exceedingly destructive to the heartwood of large tulip trees, as mentioned in a former paper (Insect Life, Vol. VII., p. 150). Subsequent observations lead me to conclude that this is one of the most destructive wood-boring insects that infests the wood of living trees, and that the destruction of valuable timber by it results largely from primary injuries by fire.

The cocoons of a parasite (*Gymnosetis americanus*, C.) were found in larval mines, evidently of this species, in the same tulip log previously mentioned, which may be of some service in keeping this pest in check. It evidently attacks the larvæ at the time they are forming the exit gallery for the adult, since at other times the larvæ are so deep in the heartwood of the tree that they could not be reached by the ovipositor of the parasite.

On July 7th of the present year (1896), I found a female example of the large and beautiful *Leptura emarginata* ovipositing in the dead wood of a wound in a living beech tree, and numerous large holes were observed in the same wood, from which the beetles had evidently emerged, thus indicating that this species may also be classed among the destructive heartwood borers.

There are probably several other Cerambycid and Buprestid species that contribute to this class of injury to living trees, and, since the results of their work are practically the same, they may be designated as *Destructive Heartwood Borers*.

DESTRUCTIVE BARK BORERS.

With the exception of certain Scolytidæ, notably *Dendroctonus frontalis*, the most destructive and dangerous class of insects that attack living trees belongs to the genus *Agrilus*, since their habit of ovipositing in the bark of healthy trees in which it is possible for the larvæ to develop makes it possible for them to effect a terrible destruction of timber should they ever occur in sufficient numbers to take the character of an invasion.

Agrilus bilineatus is already to blame, either directly or indirectly, for the death of a great quantity of oak and chestnut timber, not alone in West Virginia, but in different sections of the country between here and the Mississippi River. Until last fall the dying of trees with which this insect was intimately associated was decidedly on the increase.

The beech, the dogwood (*Cornus florida*), the hickories, the horn-beam, willows and poplars are suffering more or less from the attacks of this class of bark-borers. These insects are, however, attacked by Braconid and other enemies that may tend to keep them in check; yet, notwithstanding this fact, they must be considered as among the most dangerous enemies of trees.

Sassafras and Sumac Twig Girdlers.—The injury to twigs and branches of sassafras and sumac by Cerambycid twig-girdlers has been on the increase for some years in our State, as is a similar trouble affecting the dogwood. I was fortunate enough to find the beetle that is to blame for the interesting double girdles so common on sassafras, which proved to be *Oberca ruficollis*.

Brenthid Injuries to Rock-Oak Logs.—An interesting observation was made with reference to injuries by *Eupsalis minuta* to rock-oak (*Quercus prinus*) logs from which the bark had been removed for tanbark. It was found that the logs bearing the mark of the axe, where they were girdled in the process of removing the bark, were infested with this destructive pin-hole borer, the eggs having been deposited in the axe wounds. Logs that were not injured by the axe were not infested. Since the peeled logs are often left in the forest for a year or more before they are converted into lumber, it is quite important that the sapwood should be injured as little as possible during the process of removing the bark. If the logs are not thus injured they may remain sound and make good lumber for several years after the tree is felled, but if injured as mentioned, the wood may be literally ruined by the Brenthid within one or two years after the bark is removed.

A Brenthid larva that appears to be quite different from that of *E. minuta* was recently found boring in the heartwood of a hickory tree, and the characteristic mines of Brenthid larvæ have also been observed in the heartwood of wild cherry (*Prunus serotina*) and other trees.

Hickory Nut Phylloxera.—On December 15th, 1895, I found a large hickory tree which presented quite a striking appearance. The nuts, of which it was very full, had not fallen, and upon closer examination it was noticed that they had assumed a curious abnormal growth, which was found to be the work of a Phylloxera. This is probably the work of *Phylloxera caryocaulis* or a nearly allied species (mentioned in Illinois Agr. Report, 1878, page 160).

A Maple Twig Borer (———) was one of the commonest shade tree pests in West Virginia during the past spring. It attracted general attention in all parts of the State, and was the cause of extensive correspondence in answer to inquiries. It is the larva of a moth that bores in the tips of the young, growing twigs of all species of *Acer*. So common was the injury by it that large trees presented the appearance, in June, of having suffered from a severe frost. It occurred in all the life zones of the State, from the Upper Austral to the Canadian. It makes its appearance soon after the leaves appear in the spring, and continues operations until about the middle of May, the moth emerging in June.

Oyster-Shell Bark-Louse on Pennsylvania Maple.—In May, 1896, I observed, while in the Canadian Zone of the State, that some of the small trees, and twigs on other trees of this maple, were out in leaf far in advance of other examples of the same species, the former being in fruit, while the latter had just commenced to flower. This was found to be due to the influence of the Oyster-Shell Bark-Louse, which occurred on all of the early fruiting twigs in great numbers.

The Locust Leaf Beetle (*Odontota dorsalis*).—This beetle is again common and destructive to the yellow or black locust leaves over the greater part of the State, it being destructive this year in localities which heretofore have been exempt. This beetle has been observed by me feeding on the leaves of white oak, beech, birch, hawthorn, and apple, thus indicating the possibility of its changing its normal habits and becoming destructive to the foliage of other trees, including the more valuable fruit trees.

A Remarkable Injury to the Leaves of Forest Trees by an Unknown Insect.—Last fall, while collecting in and near the western border of the Transition Life Zone, or what is known as Laurel Hill and Cheat Mountain, I observed that the leaves of all kinds of forest trees were literally riddled with holes of various sizes, as if they had been caused by hail when the leaves were young. This condition extended for a distance of four or five miles along the summit of the mountain and down the western slope to what appears to be the line separating the Upper Austral and Transition Life Zones. No trace or evidence could be found at the time to indicate what insect was to blame for this remarkable condition. The region has been frequently visited this spring and summer, and while the

same condition occurs this year as was noted last, and a large number of insects of various kinds have been observed feeding on the leaves, none of those I found were common enough, at any one time, to indicate that they were to blame for the trouble.

I am inclined to think now that it is the work of some nocturnal insect, possibly a Scarabæid.

Xyleborus celsus in Hickory.—On Dec. 1st, 1895, I discovered a number of colonies of a Scolytid in a hickory stump, which revealed numerous males of the species, as well as some good examples of the galleries. The interesting features of the discovery were presented to the W. Va. Academy of Science in a paper read at a meeting held on Dec. 3rd. Attention was called to the rarity of the male, and that this was probably the first time it had been found in company with the female. But one male was found in each colony of 40 to 50 females, and it was usually located at the farther end of one of the galleries, where it was imprisoned by the females, which were closely crowded in the galleries in Indian file, with their heads towards the inner end. One female guarded the single entrance to the suite of galleries from all intruding enemies by stationing herself just within the entrance and presenting her armoured elytral declivity as an impenetrable barrier to the would-be intruders. This habit and method of guarding the entrance to the brood-galleries is common with most Scolytidæ, and possibly serves in part to explain the object of the peculiar form of the elytral declivity in *Platypus*, *Xyleborus*, *Tomicus*, *Scolytus*, and other genera.

Some of the females of the bark-infesting species, after they have fulfilled their mission of forming the egg-galleries and depositing eggs, station themselves at the entrance, where they die at their maternal post of duty, their dead bodies forming as effectual a barrier against the entrance of certain enemies as if living.

The male *Xyleborus celsus* is evidently identical with Leconte's *X. biographus*, as was thought probable by Eichoff.

The Willow Leaf Beetle, *Lina lapponica*, was exceedingly common during the early part of the season, completely defoliating all kinds of willows in some sections of the State, and often doing serious damage to the foliage of certain cultivated poplars. Spraying with Paris green was recommended for the protection of cultivated willows and poplars.

Pines Exempt from the Attack of D. frontalis.—I have not, as yet, been able to find a single living example of *Dendroctonus frontalis* in the State since the fall of 1892. Thus, no opportunity has been offered to continue the experiment with the imported *Clerus formicarius* as an enemy of this species, as was intended. The sudden and apparently utter disappearance of *D. frontalis* over an area of some ten to fifteen thousand square miles, where it had occurred in such enormous and destructive numbers, is yet somewhat of a puzzle to me. What little evidence I have been able to obtain, however, points to a contagious disease, producing a widespread epidemic, as the only logical explanation of the phenomenon.

Last spring I received some pine bark from North Carolina, which had been taken from one of many pine trees that had recently died. This bark bore the unmistakable evidence of the work of *D. frontalis*, and an example of the species was found in the bark. The fact that the species is living in that section of the great pine belt would indicate that it is only a matter of time when another invasion may be expected.

Diseases of Forest Tree Insects.—On Dec. 25th, 1895, while cutting in a decaying beech log in search of the larva and imago of a large Buprestid, *Chalcophora campestris* (?), I found that large numbers of the larvæ and pupæ had been attacked and were completely enveloped by a white, fluffy fungous growth, resembling closely the description of Prof. Luggers's *Isaria tomicii*. It was also found that this fungus had attacked and killed other insects that infested the log, including larvæ, pupæ and adults of the common Tenebrionid, *Nyctobates pennsylvanica*, and imagoes of the Scolytid, *Platypus compositus*. Apparently the same fungus was also found in the entrance to the brood-galleries of *Xyleborus celsus*, in hickory, which were filled with a brood of living beetles. The fungus had apparently crowded back the guarding female into the secondary galleries, where it, with other examples of the brood, appeared to be hopelessly imprisoned, since they did not appear to be able to emerge through the leather-like substance of the fungus.

PTEROPHORIDÆ.—Prof. C. H. Fernald, of the Agricultural College, Amherst, Mass., who recently published a valuable monograph upon the Crambidae of North America, is now engaged upon a similar work on the Pterophoridae, and would like to obtain materials from all quarters. He prefers that specimens should be sent to him pinned and spread, not in papers.

SOME NEW NEMATIDS.

BY C. L. MARLATT, U. S. DEPT. AGRIC., WASHINGTON, D. C.

The following descriptions of sawflies belonging to the subfamily Nematinae include, with one exception, a number of species which have been reared from the larvæ by Mr. H. G. Dyar. Mr. Dyar is anxious to publish the descriptions of the larvæ, and the technical descriptions of the species presented herewith are made to enable him to assign his larvæ to described species and avoid the difficulties which would arise from the description of larvæ before the adult insects have been characterized. The very valuable work which Mr. Dyar is doing in rearing larvæ is resulting in the clearing up of some puzzles in the classification of insects, and has no more interesting outcome than the fact that many of his rearings, at least in the line of sawflies, prove to be of species hitherto undescribed, showing how little we really know of the insects of this group in this country. The adults of most sawflies rarely leave their food-plants, and live but a few days, and hence it is not at all to be wondered at that so many species occurring on common plants have not been taken by collectors. The collected species, in fact, are usually only those which happen to frequent flowers and those taken by random beating, which, with insects of quick flight, like many sawflies, is not a very successful method of collecting. A vast deal of work will have to be done on the lines followed by Mr. Dyar before anything like an adequate knowledge of our insects in this family will have been gained. These species are additions to the recent revision of the Nematinae, published by the Department of Agriculture, as Technical Bulletin No. 3 of the Division of Entomology, and are described in conjunction with the tables and descriptions therein contained, so that the affinities of these additional species may be easily recognized.

Camponiscus americanus, n. sp.

Female.—Length, 6 mm.; a short, robust species; head broad, as wide or wider than thorax; clypeus deeply circularly emarginate; lobes broad, rounded; walls about ocellar basin sharply defined; frontal ridge strong, bulbous, unbroken; fovea broad, deep; antennæ short, tapering, smooth; joints three and four subequal, or three slightly longer than four; venation normal for genus; third cubital cell of left wing divided by a cross vein; claws bifid; teeth not very long, stout; sheath obliquely tapering on lower margin, fringed with short hairs; cerci long, strongly tapering. Colour reddish-yellow; antennæ dark brown above,

except at tip ; small spot, including ocelli, tip of scutellum, meso-post-scutellum, and central area of metathorax, hind coxæ and base of abdomen beneath, dark brown ; more or less of meso-epimera, femora, especially hind pairs, and tips of hind tibiæ and hind tarsi, brownish or infuscated ; veins light brown, with yellowish hyaline portions, especially towards base of wings ; stigma very broad, yellowish hyaline.

Male.—Length, 5 mm.; much more slender than female ; antennæ more robust, compressed, not relatively much longer than antennæ of female ; third cubital cell of anterior wings subject to much variation, bordering cross lines sometimes almost touching each other. Colour reddish-yellow and black ; upper edge of antennæ, including all of two basal joints, large spot surrounding ocelli, lateral lobes of mesonotum, scutellum, metathorax, and abdomen, for the most part dorsally, together with spot on pectus and base of abdomen ventrally, with bases of posterior coxæ, brownish-black ; legs uniformly reddish-yellow ; hind tarsi slightly infuscated ; veins little darker than in female ; stigma yellow hyaline or very slightly infuscated about margin.

Described from two specimens, male and female, reared by H. G. Dyar, from larvæ on poplar, taken at Jefferson, N. H. This species is the first representative of the genus *Camponiscus* found in America. It seems to be distinct from any European species, and is a very interesting addition to our insect fauna.

A female of this species was also received for identification from Mr. Alex. McGillivray, collected at Franconia, N. Y. This specimen measures 8 mm., and presents a rudiment of a marginal cross nerve. The metathorax and the venter of the abdomen basally, as also the hind tibiæ and tarsi, are unicolorous with the body.

Pteronus ostryæ, n. sp.

Female.—Length, 6 mm.; moderately robust ; clypeus very broadly circularly emarginate, lobes small ; pentagonal area with distinctly elevated limiting walls ; crest unbroken ; fovea deep, triangular ; antennæ long, tapering, third and fourth joints subequal ; sheath short, rather robust, regularly tapering ; claws deeply and evenly cleft ; venation about normal ; upper discal cell of hind wings considerably exceeding lower ; stigma broad, regularly rounded on lower margin. Colour for the most part light greenish-yellow ; antennæ, compound eyes, large spot, including ocelli and extending back over occiput, lobes of mesonotum and metanotum and base of dorsal sclerites of abdomen centrally, apex of

sheath, apex of hind femora, distinctly defined apical two-thirds of hind tibiæ, hind tarsi and large spot on upper angle of meso-epimera, black or dark brown; wings hyaline; veins, except costal, brown; stigma brown.

Described from a specimen reared by H. G. Dyar, from a green larva (edge eater?) supposed to have come from hornbeam (*Ostrya americana*) taken in New Jersey. This species is closely allied to *P. odoratus*, Dyar.

Pontania terminalis, n. sp.

Female.—Length, 4 mm.; not very robust; shining; clypeus very shallowly, broadly emarginate; vertex with scarcely distinguishable pentagonal area, smooth or with ridges rounded, subobsolete; fovea shallow; antennæ with third joint slightly longer than fourth; venation about normal; outer veins of discal cells of hind wings interstitial; stigma not very broad, tapering regularly to tip; claws large, deeply cleft; sheath narrow, regularly tapering, or slightly emarginate on lower edge; cerci short. Colour black, shining; apex of clypeus, other mouth-parts, angles of pronotum, tegulæ and legs, for the most part, light yellow; extreme bases of coxæ and hind tibiæ and tarsi brownish-black; wings hyaline or nearly so; veins, including all of stigma, strongly infuscated.

Male.—Length, 3.5 mm; much more slender than female; structure as in female; antennæ slightly more robust and with shorter joints; colour as in female, except venter, which is reddish-yellow, more or less infuscated, especially on the lateral area.

Described from three females and two males reared by H. G. Dyar, from imperfect galls in the partly-rolled terminals of willow leaves. Specimens collected near New York City. Types in Coll. U. S. Nat. Mus., and collection of H. G. Dyar.

This species is somewhat closely allied to *Pontania hyalina*, but differs in important characters and distinctly in the habit of the larva in partly rolling the leaf and formation of imperfect gall.

Pontania populi, n. sp.

Female.—Length, 5 mm.; robust; shining; clypeus deeply emarginate; lobes somewhat pointed; labrum with rather long yellowish hairs; ridges about ocellar basin sharply defined; frontal crest stout, unbroken; fovea oval; antennæ short, moderately robust, third joint a little longer than fourth; venation normal, except that the second recurrent is very near the second transverse cubital, and the outer veins of the discal cells of hind wings are interstitial or nearly so; claws deeply and

evenly cleft; sheath elongate, narrow, regularly tapering; cerci very slender and elongate. Colour black, shining; apical half of clypeus and other mouth-parts, broad outer angles of pronotum, tegulæ, and legs, for the most-part, light yellow; posterior tarsi slightly infuscated; extreme base of coxæ, especially posterior pair, brownish-black; venter of abdomen yellowish, strongly infuscated; wings hyaline; veins, including all of stigma, dark brown.

Described from a single female, reared by H. G. Dyar, from larva collected in New York. This species is related to *Californica*.

The larva is practically the same in habit as *P. terminalis*, except that it is a different colour and lives on *Populus grandidentata*.

Amauronematus azaleæ, n. sp.

Female.—Length, 7 mm.; rather slender; clypeus very broadly and shallowly emarginate; frontal crest very strongly raised, bulbous, unbroken; walls about ocellar basin distinctly defined, not very prominent; fovea shallow, elongate, oval; antennæ short, tapering, fourth and fifth joints longer than third; claws deeply cleft, rays subequal; sheath pointed, with distinct scopa near tip; cerci long, slender, nearly filiform; venation normal; stigma narrow, strongly acuminate. Colour dull black and pallid white, the latter restricted to face below antennæ, orbits, pronotum, tegulæ, and entire venter except meso-epimera and sheath, more or less of the margins of some of the basal dorsal sclerites and lateral edge of all of dorsum of abdomen, including the sides of the large clasp-ing terminal arc, also pallid; legs slightly infuscated on upper and lower edges of femora, tibiæ and tarsi; hind tarsi altogether infuscated; wings hyaline, veins dark brown, including all of stigma.

Male.—Length, 5.5 mm.; slender; structurally about as female. Colour the same, except that the abdomen is black above and the lateral area of the ventral sclerites is strongly infuscated; the pronotum is also more or less black near the anterior edge, and the extreme base of coxæ, especially the hind pair, is more noticeably infuscated.

Described from two specimens, male and female, reared by H. G. Dyar, from larvæ collected at Jefferson, N. H., on Azalea. The female of the species is very near *oregonensis* in colour, but differs in the darker stigma and wing veins, and in the infuscated terminal dorsal arc of the abdomen.

Amauronematus similis, n. sp.

Female.—Length, 9 mm.; rather slender, graceful; surface of head and thorax finely punctured, opaque; abdomen smooth, shining; insect clothed with very short fine whitish pubescence; clypeus narrowly, rather deeply, emarginate; lateral walls about ocellar basin rounded; frontal crest deeply broken by backward extension of deep elongate antennal fovea; antennæ short, tapering, third joint shorter than fourth or fifth; claws evenly and deeply notched; sheath elongate, slightly tapering, rounded at tip; cerci filiform, nearly as long as metatarsal joint of hind foot. Colour black; triangle beneath antennæ, clypeus, labrum, cheeks, base of mandibles and wide angles of pronotum, yellowish-white; labium and palpi greatly protruding, black; anterior faces of fore legs, from the middle of femora downwards, yellowish infuscated; venter of abdomen, except apex, yellowish, especially on lateral margin, with base of segments strongly infuscated and all very much obscured with brownish-black; wings hyaline or very slightly clouded near veins; veins and stigma black.

Described from a single female reared by H. G. Dyar, from larvæ on willow, collected at Jefferson, N. H.

This species is closely allied in general appearance to my *A. Comstocki* and *A. gracilis*, but differs in important colorational characters, and seems intermediate between the two. It may be that ultimate rearings will show that all three of these species, now apparently distinctly differentiated, are merely varieties or indicate wide seasonal or local variations.

Amauronematus Dyari, n. sp.

Female.—Length, 6 mm.; robust; head and thorax opaque; clypeus shallowly emarginate; walls of ocellar basin wide, rounded, frontal crest distinctly broken; antennal fovea circular, with branches extending over base of antennæ; antennæ short, moderately robust, joints not at all nodose at tips, 3-5 subequal; venation about normal; stigma rounded on lower margin, not tapering; sheath tapering, obtusely pointed, clothed with short and rather dense hairs; claws deeply and evenly cleft. Colour resinous-yellow, with the thorax and head reddish; antennæ, narrow ring about each ocellus, meso-postscutellum, black; meso-scutum and more or less of centre of basal plates brownish; tips of posterior tibiæ and their tarsi slightly infuscated; wings hyaline, veins light brown, stigma and costa yellowish hyaline.

Male.—Length, 5 mm.; not robust, approaching slender; clypeus much more distinctly emarginate than in female; character of vertex and antennæ about as in female; procidentia very short and broad, more than twice as wide as long; venation and claws as in female. Head, for most part, and thorax and abdomen above, black; face below antennæ white; most of pronotum, the tegulæ and the venter, with legs, resinous-yellow; pro-episterna, and base of meso-epimera, brown; abdomen slightly smoky beneath; posterior tibiæ and their tarsi slightly infuscated, wings hyaline, veins brown, stigma and costa hyaline, former darker basally.

Described from two bred females and two bred males in Coll. of H. G. Dyar. This species is closely allied to *brunneus*, and was briefly described by Mr. H. G. Dyar (including a careful description of the larvæ), from six males and four females under Norton's species, *Nematus monochroma*, from which, however, it is unquestionably distinct. The larvæ are gregarious edge-feeders on poplar, somewhat resembling the larvæ of the common willow sawfly (*Pteronus ventralis*) in appearance and habit [see CAN. ENT., XXVI., page 187, 1894].

Pachynematus gregarius, n. sp.

Female.—Length, 4.5 mm.; not robust, surface shining; head distinctly narrowing back of compound eyes; clypeus broadly and shallowly emarginate; pentagonal area depressed, limiting ridges low, rounded; frontal crest unbroken, not prominent; antennal fovea shallow; antennæ short, slender, scarcely tapering, third joint distinctly longer than fourth; sheath short, obliquely truncate, pointed at tip; first transverse cubital hyaline or subobsolete; upper middle cell of hind wings considerably exceeding lower; stigma broad, rounded on lower margin, not tapering; claws with inner tooth remote from apex. Colour brownish-black and resinous-yellow; antennæ, head and dorsum of thorax and abdomen for the most part, sheath and upper half of meso-epimera, dark brown; mouth-parts, tegulæ, outer one-half of pronotum, legs and venter, together with lateral margin of dorsum of abdomen and terminal dorsal sclerites, yellow; light area of epimera and pronotum slightly infuscated; wings hyaline, stigma and nervures light brown.

Male.—Length, 4 mm.; structurally as in female, except that the ridges about ocellar basin are more sharply defined; procidentia narrow, tapering, pointed at tip; antennæ, large spot on vertex about ocelli and extending over occiput, thorax above except pronotum and tegulæ, and central dorsal area of abdomen (paling towards tip), brownish-black;

balance of insect resinous-yellow, except slight dark spot beneath wings.

Described from one female and one male bred by Mr. H. G. Dyar, from larvæ taken on willow in New Hampshire and New Jersey. The larvæ are described as resting flatly on the surface of the leaves, which they skeletonize, and as being gregarious and, in appearance, shining like a slug.

Types in Coll. U. S. Nat. Mus.

Pachynematus pubescens, Marlatt.

Male.—Length, 8 mm.; elongate, slender; head and thorax densely clothed with long sordid yellowish hairs; clypeus shallowly emarginate, strongly transversely keeled; ridges about ocellar basin distinct, but slight; crest not prominent, unbroken; fovea oval; antennæ very long and slender, joints nodose at tips, fourth and fifth longer than third; third cubital and second recurrent, and outer veins of discal cell of hind wings interstitial; third cubital cell large, divaricating apically; stigma long, narrow, tapering; procidentia wide, tapering, truncate at tip; inner tooth of claw very minute. Colour black, shining, including all of head, with mouth-parts, pronotum and tegulæ; apical half of hypopygium, apices of femora, and the tibiæ and tarsi, reddish-yellow, infuscated; genitalia pallid; wings hyaline, veins brown, stigma yellowish, usually with a brownish tinge, much darker than stigma of *apicalis*.

Described from six specimens from Cornell University, collected on Mount Washington, at an elevation of 5,500–6,000 feet, July 9th, 1891. In structural and colorational characters the male of this species is very close to the male of *extensicornis*, but is readily distinguished by the remarkable hirsute clothing of the head and thorax.

The female of this species was described in my Revision of the Nematineæ of North America. (Tech. Ser. No. 3, U. S. Dept. Agric., Div. Ento., 1896, p. 100.)

Hemichroa laricis, n. sp.

Female.—Length, 5.5 mm.; robust; shining; clypeus broadly, shallowly, emarginate, and with strong transverse ridge near base; pentagonal area distinctly defined; ridges somewhat rounded; fovea shallow, circular; antennæ very slender, filiform, fourth joint much longer than third; sheath short, rounded at tip; cerci short; claws simple, without inner tooth; venation normal. Colour black; mouth-parts scarcely paler than the general body colour, or very slightly reddish; tegulæ and legs

pallid, strongly infuscated; coxæ black; wings slightly infuscated; veins brown, stigma pale centrally.

Described from a single female reared by H. G. Dyar, from larva collected on larch.

Mr. Dyar states that this is identical with the larva referred to in the Fifth Report of the U. S. Entomological Commission, as No. 26 of larch insects, *Selandria* sp.?, page 901. Mr. Dyar's specimens were collected at Jefferson, N. H.

ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

EIGHTH ANNUAL MEETING, BUFFALO, N. Y., AUGUST 21-22, 1896.

The Association was convened in the Lecture Hall of the Library Building, Buffalo, N. Y., and its meetings were attended by some nineteen active members, including the following officers: President, C. H. Fernald; Vice-president, F. M. Webster; and Secretary, C. L. Marlatt. The Entomological Society of Ontario was represented by the Rev. C. J. S. Bethune and Dr. James Fletcher. A number of entomologists not members of the Association were also present, with other zoologists, the number of persons present at the meetings averaging about thirty.

The following new active members were elected:—

W. G. Johnson, College Station, Md.

E. E. Bogue, Stillwater, Okla. Ter.

James S. Hine, Wooster, Ohio.

C. W. Mally, Wooster, Ohio.

H. L. Frost, Boston, Mass.

M. F. Adams, Buffalo, N. Y.

Lewis Collins, Brooklyn, N. Y.

W. E. Rumsey, Morgantown, W. Va.

The following new foreign members were elected:—

Chas. P. Lounsbury, Department of Agriculture, Cape Town, Cape of Good Hope.

Fred. Enock, 21 Manor Gardens, Holloway, London, England.

Dr. Enzo Reuter, Fredriksgatan, 45 Helsingfors, Finland, Russia.

Frederick B. Theobald, Wyecourt, Kent County, England.

Dr. Antonio Berlese, R. Scuola Superiore de Agricoltura, Portici, Italy.

Dr. Paul Marchal, 16 Rue Claude Bernard, Paris, France.

W. C. Grasby, Parkside, Adelaide, South Australia.

The active membership of the Association now numbers eighty-six, and includes practically all the leading workers in economic entomology in the United States and Canada. The foreign membership numbers twenty-nine, and comprises the leading official economic entomologists of the world.

A number of resolutions were passed ; among others, the following : Resolutions (1) relating to the death of Dr. C. V. Riley, the originator and first president of the Association ; (2) urging the publication by the U. S. Department of Agriculture of a general index to the seven volumes of *Insect Life* ; and (3) recognizing the importance of the work being done by the State of Massachusetts in the control of the gypsy moth, urging the continuance by the State of work in this direction and expressing the greatest confidence in the officers now charged with it.

The annual address of the President, Mr. C. R. Fernald, Professor of Entomology, Massachusetts State Agricultural College, Amherst, Mass., was entitled "The Evolution of Economic Entomology," and was devoted to a historical resumé of the progress in the practical control of insects from the earliest times to the present. The following papers were read and discussed :—

"Some Temperature Effects on Household Insects."

"On the Futility of Trunk and Crown Washes for Elm Leaf Beetle."

"Remarks on Steam Spraying Machines."

By Dr. L. O. Howard, Chief of Division of Entomology, U. S. Department of Agriculture, Washington, D. C.

"Three Years' Study of an Outbreak of the Chinch Bug in Ohio."

"Insects of the Year in Ohio."

By Prof. F. M. Webster, Entomologist to the Ohio Agricultural Experiment Station, Wooster, Ohio.

"A New Insecticide."

By A. H. Kirkland, Assistant to the Gypsy Moth Committee, Malden, Mass.

"Comparative Tests with New and Old Arsenicals on Foliage and with Larvæ."

"Insecticide Soaps."

By C. L. Marlatt, First Assistant, Division of Entomology, U. S. Department of Agriculture, Washington, D. C.

"Enemies of the San José Scale in California."

By Dr. J. B. Smith, Entomologist to the New Jersey Agricultural Experiment Station, New Brunswick, N. J.

"Insect Enemies of Forest Trees."

"Notes on Some Observations in West Virginia."

By Prof. A. D. Hopkins, Entomologist to the West Virginia Agricultural Experiment Station, Morgantown, W. Va.

"Notes on Insect Attacks of the Year."

By Dr. J. A. Lintner, State Entomologist, Albany, N.Y.

"Entomological Notes from Maryland."

By W. G. Johnson, State Entomologist, College Station, Md.

The following papers, the authors of which were not present, were read by title, but, it is expected, will be included in the published proceedings of the Association:—

"The Grasshopper Disease in Colorado."

By C. P. Gillette, Professor of Zoology in the State Agricultural College, Fort Collins, Colo.

"The Development of the Mediterranean Flour Moth."

By F. H. Chittenden, Assistant in Division of Entomology, U. S. Department of Agriculture, Washington, D.C.

"Notes on the San José Scale."

By W. B. Alwood, Vice-director of the Virginia Agricultural Experiment Station, Blacksburg, Va.

"A New Garden Smythurid."

By F. L. Harvey, Professor of Entomology in the Maine State College, Orono, Maine.

"A Simple Device for the Preparation of Oil Emulsions."

By H. A. Morgan, Professor of Entomology in the Louisiana State University, Baton Rouge, La.

The following officers were elected for the ensuing year: President, F. M. Webster; first Vice-president, Herbert Osborn; second Vice-president, Lawrence Bruner; Secretary, C. L. Marlatt.

In accordance with the established custom, the next session will be held on the two days preceding the general sessions of the American Association for the Advancement of Science, Detroit, Mich., August 6-7, 1897.

C. L. MARLATT,

Secretary.

NOTES ON COLEOPTERA—No. XII.

BY JOHN HAMILTON, M.D., ALLEGHENY, PA.

Liparocephalus cordicollis, Lec.—This species does not differ in any way from *L. brevipennis*, Mæk., except in its pale colour, and the two forms must be united, as intimated in a former paper (CAN. ENT., XXIV., 158). Since the publication of that paper more than thirty examples of *brevipennis* and several of *cordicollis* have been examined and compared. Apart from colour, not a single character of general applicability has been observed by which to separate them into species. The synoptic characters given by Capt. Casey (Ann. N. Y. Acad. Sci., VII., 354) are without value otherwise than as descriptions of those of some individuals. When a sufficient number of each form is present, all the elements, without exception, tabulated by him to differentiate *cordicollis* exist in examples of *brevipennis*, and the reverse.

L. brevipennis is very variable in most of its structural parts (length of antennæ, width of head, form of thorax, etc.), for which due allowance must be made, or about four species created.

It may be observed that Dr. Leconte described *cordicollis*. He had seen only one example from the sea coast of California, and one of *brevipennis* from Unalaschka, both of which, from his remarks, were evidently extremes, such as now exist. The pale colour of *cordicollis* may be from immaturity, just as in other dark *Staphylinida*, or it may be permanent, as occurs in variations of *Cryptobium bicolor*, *Belonuchus formosus*, etc. Rev. J. H. Keene, Massett, Queen Charlotte Islands, to whom I am indebted for such ample material, writes that he takes both forms together on the beach under rubbish in early spring, while later the pale form is not so often seen.

Tachinus Schwartzi, Horn, is by no means a common insect, and is mentioned here to record its occurrence in the mountainous parts of Western Pennsylvania. I took several examples recently in Forest County, in the pine region, from a decaying boletus growing on a pine log. It may readily be known by its black colour, elytra longer than wide and with distinct traces of sulci; the last joint of the antennæ, the four basal, and the legs, rufous; the sixth ventral segment of the male is deeply and widely emarginate, and in front of the emargination concave to the base and finely punctate, but without granulations. It was described from examples taken near Detroit, Michigan, and is known from Canada,

Trogoderma tarsale, Mels.—The larva of this species is unfavourably known as an occasional museum pest, and is generally supposed to live solely on animal matter, which it undoubtedly prefers ; but it can likewise live on vegetable food as well, as the following demonstrates : A few packed figs were placed in a paper sack and securely tied and placed in a trunk while in Florida, in May, which was not opened till May of the next year, when the figs were found infested by the larvæ and pupæ of this species, while over sixty recently disclosed beetles were taken from the sack. Possibly in this instance the parent beetle may have accidentally been inclosed with the figs, and may not have from choice selected them as suitable food for her offspring, but it is in demonstration that this species can propagate itself on either animal or vegetable products.

The larvæ are more readily distinguishable from those of *T. ornatum* than are the beetles themselves ; those of the latter have the last three abdominal segments dark ; in the former some have the last three dark, with a spot on each side of the preceding two ; some with the last and a spot on each side of the preceding two, dark, while one is occasionally seen entirely pallid. Both species pupate within the larval skin wherever it may be convenient.

Corymbites elongaticollis, Ham.—I find that this species is placed in some collections as *caricinus*, Germ., to which it bears considerable resemblance. It has been, as yet, taken but rarely in Western Pennsylvania, but appears to be more common in Canada, where I have likewise taken it. I have not seen an example of the true *caricinus* from the region eastward from the Mississippi, and I strongly doubt its existence there. Any comparison between the two species must be made with *caricinus* from the Pacific Coast. Several obvious differences will be observed : in *caricinus* the front is prolonged and much depressed at middle like in *Asaphes*, the depressed portion being smooth and with a few coarse punctures ; in *elongaticollis* the front is distinctly and uniformly elevated, more or less transversely concave and densely punctate ; in the former the thorax is less depressed, uniformly rather densely and coarsely punctured, the punctuation of the latter being comparatively fine, sparse on the middle, denser on the sides ; in *caricinus* the elytral intervals are less convex and therefore apparently wider. Many other differences exist—difficult to make plain in print to such as have not both forms, useless to such as have. No one having both would for a moment proclaim them the same species. Whoever united *umbricola*, Germ., with *caricinus*

could not have had good material of both forms before him or such a bad mistake would not have likely occurred. I have good material of the former from Vancouver and from Queen Charlotte Islands, and of the latter from Queen Charlotte Islands, and their union cannot be entertained when compared.

Agrilus macer, Lec., seems to be rare. It was described from Texas (Eagle Pass); one male occurred here five years ago, but it has not been taken since. If Dr. Horn's and Dr. Leconte's examples were ornamented with pubescence, it is not clearly set forth; in that taken here, on each side of the thorax above is a broad marginal band of white pubescence; the sternal side pieces, the vertical portion of the ventral segments, and a large spot on each side of each of the ventral segments, white, as in *difficilis*, from which it may at once be known by the furcate or emarginate projecting carina of the pygidium. In this sex the elytra are acute at tip as well as rounded and serrate, just as in *difficilis*. I have observed no other record of distribution than the above, but quite likely it is mixed in collections with *difficilis*.

Phyllodecta vitellina, Linn.—This species is recorded from Canada, Michigan and New Hampshire. No American examples have been seen, and there is strong presumptive evidence that *vulgatissima*, Linn., is the species so determined by Kirby; in his time, in Britain, the latter species was placed as a synonym of *vitellina*, and of course he would give the same name to the American examples. *Vulgatissima* is common in the regions mentioned, but no example of the other species is known. The two species are difficult to separate, even with the insects in hand, and it is more so to make an intelligible description of their differences. In both species the colour of the upper surface is equally variable—green, violet, purple or bronze; the surface of the thorax is a little uneven, sparsely irregularly finely punctured on the disc, more densely toward the sides; the elytra are serially punctured in undulating rows of fine, close-set punctures; these rows are usually much confused before the apex and at the sides; the intervals are usually impunctate. The differences at first sight are not very evident, the chief being the more elongated form of *vulgatissima* and the carination of the lateral elytral interval; *vulgatissima* is .19 inch. in length; *vitellina* .17 inch., with the width of the former and a little more convexity, which gives it a more robust appearance. The carination of the lateral elytral interval used by European authors to divide the genus into sections is not a very evident character;

by a careful examination may be seen a row of fine punctures next the margin, separated from the general surface of the elytron by a more or less sharp line, while in *vitellina* this row of punctures is more or less obsolete and not sharply separated from the confused punctuation of the contiguous surface. A little faith is sometimes required to see these differences. It would be useless to enter into more minute details, as anyone who cannot identify his insects by those given would probably fail with both species in hand. If *vitellina* occurs in North America, the above may be sufficient to cause its recognition.

P. interstitialis, Mann.—This species was described from the Yukon, from a single example, and is usually set down by American writers as a synonym of *vulgatissima*, the type being considered as perhaps deformed. The description seems, however, to forbid such an assignment, as, in addition to the usual stria arrangement, the whole of the elytral surface is represented as deeply and coarsely punctured. I have examined many specimens of the American and European *vulgatissima*, and likewise of the European *vitellina* and *cavifrons*, in all of which the intervals are practically impunctate, and show no tendency to become punctured in any degree. *Interstitialis* by description is a valid species.

Amblyderus (Anthicus) pallens, Lec., was described from examples taken on the shores of Lake Superior; a form taken on the sea coast of New Jersey, and southward, by others as well as myself, seemed from description to be the same, but it is only recently that I have been able to be assured of their identity by direct comparison of specimens. Mr. Wickham has kindly sent four examples from the southern shore of Lake Superior, between which and those from the Atlantic Coast there are seemingly no differences except those of individuality. Of those sent by Mr. Wickham, one is entirely pallid throughout, one has the abdomen partly fuscous, another entirely so, and the fourth has in addition the elytra pale livid, indicating that there may be a melanotic form. Of six sea-shore forms, two are entirely pallid, the other four have the abdomen infuscate and one of them also the elytra slightly. Inasmuch as the original description is out of print, its reproduction may be useful on account of the redescription by Capt. Casey in his recent revision of the *Anthicidae* being so seriously defective as to be misleading, describing the entirely pale and exceptional form not mentioned by Dr. Leconte, but giving no hint of the common form with the fuscous abdomen—Leconte's species.

"Testaceous, convex, pubescence white, eyes black; head triangular, base emarginate with the angles acute, a smooth longitudinal line, moderately punctate; thorax not narrower than the head, shorter than wide, obovate, obsoletely canaliculate, rather densely punctate; elytra very finely punctate, apex subtruncate; abdomen dark fuscous (*nigro-fusco*). Length, .11 inch."—[Tr.] Agassiz, Lake Superior, p. 231. Supplementary characters were added (Proc. Acad. Nat. Sci., Phil., 1852, p. 103): "Head sparingly granulato-punctate, thorax very strongly narrowed posteriorly; elytra convex, truncate at base; antennæ slender and long, terminal spurs of tibiæ very distinct, those of anterior tibiæ very unequal, the anterior tibiæ of the male slightly sinuate internally and the terminal spine more prominent." The elytra do not cover the abdomen. The pallid examples occur on the coast among the hills of white sand immediately fronting the ocean, and I took one on the beach of Anastasia Island, Florida; those with dark abdomens, a little further back at the base of those bordering on the salt meadows.

Under the name *A. arenarius*, Capt. Casey has described from a unique taken at Newport, Rhode Island, what seems to be the form of *pallens* with the fuscous abdomen, as described by Dr. Leconte.

MISCELLANEOUS NOTES.

Stagmomantis carolina, Linn.

In his index to the Mantidæ of North America (CAN. ENT., August, 1896, 211), Mr. Scudder gives the range of this species as "Florida to Arizona. . . . north to Maryland, Southern Illinois, Missouri, Kansas, and Utah."

He might also have included the southern half of Indiana, since it is common in the counties bordering on the Ohio River, and is occasionally taken as far north as the City of Indianapolis; specimens taken here (females, brown form) having been brought to me on Sept. 23rd and 26th, 1895, and Sept. 4th, 1896. I have also a green female from Mitchell, Lawrence Co. Mr. S. G. Evans, of Evansville, Ind., in a personal letter, says: "The Mantids are found here of all sizes and colours, the eggs and young being almost as common as mosquitoes. I have on several occasions placed male and female together in a glass jar, and the female always devoured the male, and generally while in the act of copulating, the bodies remaining together until the male was almost consumed."

Gonatista grisea, Fabr.

The specimen from Indiana mentioned by Mr. Scudder (*loc. cit.*)

was taken by Mr. Evans, at Evansville. As he thought it to be a short-bodied form of *S. carolina*, he has no recollection of the exact date or place in which it was found.

Acanthosoma cruciata, Say.

Mention of this handsome member of the family Pentatomidæ occurs in but few of the published lists of Heteroptera. This is probably not so much due to its scarcity as to an ignorance of its food-plant and habitat. In Indiana I have found it in abundance on several occasions, but always on the leaves and stems of Spikenard (*Aralia racemosa*, L.), growing on the sides of deep damp ravines. The mature insect may be taken during August and September.

Trichopepla semivittata, Say.

This is another uncommon Pentatomid, which appears to have a special food-plant. I have taken it but once, Sept. 9th, 1894, in Vigo Co., Ind., where I found it very common in all stages, on the heads, and in the angles of the leaves, of the plant known as Rattlesnake-Master, or Button Snake-root (*Eryngium yuccæfolium*, Michx.). The insect will probably be found wherever this plant abounds.

Libythea Bachmani, Kirtland.

This little butterfly, so readily known by its long, beaklike palpi and angled fore wings, is usually of rare occurrence in Indiana. This season, however, it has been very common, and has been noted in a number of localities in the State. On June 14th, eighteen specimens were secured from the flowers of some basswood trees (*Tilia americana*, L.), which stand in front of my residence, in a thickly settled portion of the City of Indianapolis.

Papilio philenor, L.

This butterfly is very common in Indiana, and for a long time I was puzzled as to its food-plant, the ones commonly mentioned in the books, *Aristolochia serpentaria*, L., and *A. siphon*, L'Her, being very rare in the State. The problem was solved one day, however, when I found the larvæ of *philenor* feeding upon the leaves of the wild ginger (*Asarum Canadense*, L.), a common plant along the rich hillsides of Central and Southern Indiana, and one which belongs to the same family as the different species of *Aristolochia*.

Indianapolis, Ind.

W. S. BLATCHLEY.

BOOK NOTICES.

THE GYPSY MOTH.—A report of the work of destroying the insect in the Commonwealth of Massachusetts, together with an account of its history and habits both in Massachusetts and Europe. By E. H. Forbush and C. H. Fernald.

This report, a handsome volume of nearly 600 pages, well printed and most copiously illustrated with chromolithographs, photogravures, and wood cuts, gives a full account of the introduction of the now notorious "Gypsy moth" into America by Leopold Trouvelot in 1868 or 1869, traces its history, and records the efforts which have been made to exterminate it by the State of Massachusetts up to the end of 1895. The spread of this insect for the first ten years was remarkably slow, in the light of what we now know of its capabilities for harm. During that period it was not noticed by anyone but the introducer. The first extensive outbreak was in 1889, but for ten years before that it had given great annoyance to the people living in the part of the town of Medford where it was first introduced. It had also spread and had gained a foothold in thirty townships without attracting public attention. Since that time its history is well known. In 1890 the first Gypsy Moth Commission was appointed and the work of fighting the pest was inaugurated. In February of the next year this commission was removed and another one substituted. On 12th of March, Mr. E. H. Forbush, the present very efficient Director of Field Work, was appointed, and on 18th June Prof. C. H. Fernald began his labours as Entomological Advisor. Since that time the work has been pushed on with great energy, and the present valuable report is an outcome of the combined efforts of a practical, energetic manager and a careful scientific entomologist. The two parts of this report, prepared by the above-named officers, are quite distinct and form together a very complete treatise, not only upon the Gypsy moth, but upon the general principles which it is necessary to study when combatting any injurious insect. This carefully-prepared report, therefore, cannot but be for a long time an indispensable book of reference for economic entomologists.

There are in this volume many things which will attract the attention of entomologists. Indeed, it is so full and there are so many different subjects treated of, that even to give the titles would take more space than is at my disposal. The first thing which will be noticed is the adoption of the generic name *Porthetria*. Articles of particular note deal with

the studies made as to the methods of distribution of the Gypsy moth, and the measures practised for the destruction of the insect in its different stages; spraying apparatus; and particularly the care of spraying machinery; methods of pruning; and some charming observations upon insect-eating birds.

The scientific work contained in Professor Fernald's report is of great value and contains a record of most painstaking and patient work. Probably one of the most interesting sections is that which deals with Natural Enemies, in which most excellent work has been done. Prof. Fernald has been aided in this work by efficient assistants, and the whole information so gained has been pieced together by a master hand.

With regard to spraying, some surprising results have been obtained. In the first place, the caterpillar of the Gypsy moth seems to be little affected by applications of Paris green when applied of the strength ordinarily used for other mandibulate insects. Mr. Forbush says: "It became evident before the end of the season of 1891, that spraying, while reducing the numbers of the moth, could not be relied upon as a means of extermination, for many caterpillars survived its effects."

The following conclusion, on page 139, will show entomologists that the matter of controlling mandibulate insects, by means of active poisons, is still a fertile field for careful work, in which useful and laurel-bearing results are still to be reaped:—

"Every effort was made during the spraying season to determine why the results of spraying were not uniform and satisfactory. The feeding caterpillars were watched day and night by many observers. The spraying was most carefully superintended, and the conclusion finally arrived at was that, under ordinary conditions, spraying with Paris green for the Gypsy moth was ineffective and unsatisfactory."

Paris green was on the whole the most fatal insecticide, and when used in the proportion of one pound to 150 gallons of water, did not burn foliage; but with larger proportions, did considerable harm. The injury developed so rapidly that within a short time the leaves were all killed and the surviving larvæ had to go elsewhere to feed. "Therefore, a strong Paris green mixture had little better effect than a weak one. Lime was then used with the Paris green, with a view of neutralizing the burning; but considerable injury to the foliage still continued."

Probably one of the most remarkable facts discovered by the entomologists is related by Prof. Fernald, on page 476, where he says: "One

interesting result obtained from the analyses of the different stages of the Gypsy moth made in 1893 and 1894 is that pupæ and imagoes from caterpillars which have been reared on leaves sprayed with Paris green or arsenate of lead may contain arsenic in recognizable quantities. Several pupæ and a few female imagoes obtained under these conditions, when subjected to chemical analysis, gave ample evidence of the presence of arsenic in their bodies. This shows that the presence of arsenic in the pupa may not materially interfere with the processes involved in the development of the imago. Since, as has been repeatedly demonstrated, moths reared from poisoned larvæ are capable of reproduction, it is also evident that the arsenic contained in their bodies does not injure the reproductive function." With reference to the amount of arsenic which could be consumed by some of these caterpillars, and yet leave them "normally active and healthy," it was found that some of them had in their bodies, in proportion to their weight, an amount equivalent to $12\frac{1}{2}$ times the fatal dose for an adult human being, in proportion to the weight of the latter.

The work of the Gypsy Moth Committee has been criticised, examined and studied by practical men who were entomologists and others who were not. As far as I can learn, the general verdict is that excellent work, and, under the circumstances, remarkably so, has been done. The insect is not exterminated, it is true; but there seems every reason to hope, judging from what has been done and the behaviour of the species in other countries where it was once alarmingly abundant, that this is possible if money be supplied and if it be given at the time when it can be made use of to the best advantage. On pages 38 to 93 of the report will be found an instructive account of the constant efforts of the committee to get funds to carry on the work properly, and year after year it was the same story of reduced, and what was almost worse, delayed, appropriations, resulting in the necessity of modifying the whole plan of work arranged for the year; so that instead of making vigorous efforts for the extermination of the insect, and fighting it at the time this could be most effectively done—early in the season when the caterpillars were small—all that could be done was to try and prevent the further spread of the enemy from the localities known to be infested. The appropriations which have been made for this work are considerable, about \$525,000 up to the present time, and this amount would certainly have produced far better results could the committee have obtained the grants

at the time they required them, so that they could have begun the work early in the season and continued employing, from year to year, those assistants who had been taught, at an expense of much time and trouble, what was required of them.

J. FLETCHER.

Mittheilungen aus dem Roemer-Museum, Hildesheim. No. 6.—Juni, 1896. DIE SATURNIIDEN (Nachtpfauenaugen), von A. Radcliffe Grote, A. M.

This paper of 28 pages is illustrated by three plates and eighteen cuts. The illustrations are from photographs of living moths and are remarkably fine. The author defines the superfamily Saturniides and gives a table separating the families and a number of genera. The value of this table is unfortunately vitiated by the curious spacing, which renders it practically impossible to follow it.

The Saturniides are divided into two families, and each of these into three subfamilies. The Endromidæ, Bombycidæ, and Lacosomidæ are shown not to belong to the group, principally on larval characters. The relations of the Sphingidæ are also briefly discussed. Following are remarks on parthenogenesis and hybridization in the group, a discussion of the subfamilies adopted, geographical distribution, nomenclature, certain corrections to the author's previous paper on the Apatelidæ, and a list of European and North American Saturnians.

No fault is to be found with the classification which the author has worked out, regarded as an artificial grouping. A certain character of venation is selected (position of vein IV_2 on primaries) and the groups referred strictly by this character. A natural classification, which should combine several such special ones, is not attempted. As compared with the reviewer's classification on larval characters, the position of the groups represented by Hemileuca and Aglia are transposed. Mr. Grote must, therefore, suppose that the larva of Aglia is derived from a Citheronia type independently of the Saturnia branch. The larva should have re-acquired the pair of anal tubercles which are already entirely lost in Citheronia, and lost the unpaired tubercle on joint 13. He must also suppose that the stinging spines have been twice separately evolved in the group. On the other hand, to reconcile his grouping with mine it is only necessary to suppose that vein IV_2 has moved toward IV_1 in Hemileuca separately from the types of Attacus and Saturnia, where this process is congenital.

HARRISON G. DYAR.

The Canadian Entomologist.

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No. 11.

BUTTERFLIES TAKEN AT ORILLIA, ONT.

BY C. E. GRANT.



FIG. 23.

I have been collecting Lepidoptera in Orillia and its vicinity for over thirty years, off and on, and thinking that it would be of interest to my brother collectors to have an idea of the fauna of this district, I send you a list of the diurnal Lepidoptera taken by me as far as identified.

Danaus archippus.—Common from June 5th to October.

Argynnis atlantis.—Common from June 4th to August.

" *cybele*.—Common from June 16th to August 31st.

" *aphrodite*.—Not so common, from June 23rd to August. One specimen of *Argynnis* taken by me presented a very dark appearance, nearly black, on the basal portion of the wings, with a greenish tinge on the outside edge of dark base, supposed to be a melanic female of *cybele*.

Argynnis myrina.—Common; two broods, June and August.

Phyciodes tharos.—Forms *marcia*, *morpheus* and other varieties common May 24th to July.

Phyciodes nycteis.—Fairly abundant; one brood in June.

" *Batesii*.—One specimen taken in July.

Grapta interrogationis.—Forms *umbrosa* and *Fabricii* common. There are three broods here.

Grapta comma.—Forms *dryas* and *Harrisii* both fairly common.

" *progne*.—Common all the season.

" *gracilis*.—Two specimens taken in July on *Asclepias*.

" *faunus*.—Rare.

" *j. album*.—Common some seasons in September.

Vanessa antiopa.—Common.

Vanessa Milberti.—Common. I think there are three broods.

Pyrameis atalanta.—Usually common in spring. This year remarkably abundant in first week of August. Saw hundreds on August 6th; took six at one sweep of the net; since then have not seen one.

Pyrameis huntera.—Not uncommon in August.

" *cardui*.—Generally common. Have not seen any this year up to this date, August 31st.

Limenitis arthemis.—Not very common in June. Very few this year, but of remarkably large size.

Limenitis disippus.—Moderately common. Second brood in July and August in low lands.

Debis portlandia.—Two specimens taken near Coldwater, on Matchedash Bay, in August, 1883.

Neonympha canthus.—Common in low meadows in July.

" *eurytris*.—Very common in open woods in June.

Satyrus nephele.—Taken occasionally in July. Not seen of late years.

Thecla acadica.—Usually three or four in a season in July. Very plentiful this year. Took forty specimens.

Thecla titus.—Also common this season; usually rather scarce in July.

" *strigosa*.—Have taken one or two every season in July.

" *calanus*.—Rather rare in July.

Feniseca tarquinius.—Moderately common through the season in one locality.

Chrysophanus thea.—Also very local, but not uncommon when their habitat is known. Two broods, end of June and end of August.

- Chrysophanus hypophleas*.—Common all the season.
- Lycæna pseudargiolus*.—*Lucia* very common in April and May. *Neglecta* not so abundant in July and August.
- Pieris oleracea*.—Spring type common in April and May. Summer form also. Have also taken *virginiensis*.
- Pieris protodice*.—Common years ago. One male taken last year in August.
- Pieris rapæ*.—Everywhere abundant.
- Colias eurytheme*.—Common in 1872; not seen here of late years.
- " *philodice*.—Abundant. Also albinic female occasionally.
- Meganostoma cæsonia*.—Quite common this year from June 6th to July 13th. Only one specimen taken before, about thirty years ago.
- Papilio turnus*.—Generally common in May, June and July; scarce this year. Have taken a specimen of a melanic male similar to one figured in CANADIAN ENTOMOLOGIST some years ago by Dr. Fletcher. (Fig. 23.)
- Papilio asterias*.—Formerly rather common; now scarce.
- " *cresphontes*.—Has been taken in Orillia, but not by myself.
- Pamphila zabulon*.—Forms *hobomok* and *pocohontas* common in May and June; one brood.
- Pamphila mystic*.—Common in June and August; two broods.
- " *cernes*.—Very abundant in June. Second brood scarce in August.
- Pamphila peckius*.—Also common; taken in June and end of August.
- " *metacomet*.—Rather scarce in July.
- Nisoniades juvenalis*.—Not uncommon in May and June.
- " *icelus*.—Not uncommon in May, June and July.
- " *brizo*.—Scarce; two or three specimens.
- " *lucilius*.—Scarce.
- Eudamus pylades*.—Abundant end of May and June.
- " *tityrus*.—Not abundant, in May, June and July; and a specimen which I take to be *Eudamus bathyllus*, but of which I am not sure.
- Pholisora catullus*.—Taken sparingly in June.

This comprises all the local diurnals which I have found in this district, except one or two species of *Pamphila* which I am unable to identify, making fifty-three or fifty-four species. I have about 200 species

of Noctuidæ and 100 or so of Geometridæ, etc., but having had no chance of seeing other collections, from the present state of literature I cannot identify a great number.

I should like very much if some of your readers could give me the life-history of *Brephos infans*, particularly as to the time of flight. I have taken this rare moth when a boy, and knew enough to mention that it was caught "at birch trees in May," but neglected to note whether it was day or night, and I cannot remember now. I have several other rare captures, and some day might report them if you think it would interest your readers.

[NOTE.—*Brephos infans* is a day flier, and from its irregular flight, as well as its colour, is very difficult to follow. The larva feeds on birch.—Ed.]

NOTES ON THE PREPARATORY STAGES OF EREBIA EPIPSODEA (BUTLER).

BY H. H. LYMAN, MONTREAL.


In Part IX. of the 3rd series of Edwards's Butterflies of North America is given a very full and beautifully illustrated history of this species from the egg to imago; but as I have bred this species during the summer of 1895, through all its stages, and as the life-history, as worked out by me, differs in certain important particulars from that recorded by Mr. Edwards, I think it advisable that I should give my experience in the rearing of this very interesting species.

On 4th of July I received from Mr. J. A. Guignard, Assistant Botanist and Entomologist of the Central Experimental Farm at Ottawa, a number of eggs which had been sent to Dr. Fletcher by Mr. T. N. Willing, of Olds, Alberta; Dr. Fletcher having left for an extended trip through the Northwest Territories and British Columbia. The eggs were hatching when received, and their colour could not, therefore, be ascertained. They had been sent on 24th June, and the egg period, supposing them to have been laid the day before they were mailed, would be, thus, 11 days. No intimation was given me as to the species, but I afterwards received from Mr. Guignard a specimen of *E. Epipsodea*, which had been sent along with the eggs, and was doubtless the one that laid them.

Egg.—Height, 1.06 mm.; diameter, .89 mm.; very much of the general shape of that of *C. Jutta*, as figured in Scudder's Butterflies of New

England, pl. 64, fig. 2. Slightly widest at one-third from base. Ribs about 22-24, well marked, but not very prominent, and with many cross ribs, as in Scudder's figure of that of *Satyrus Alope*, fig. 3 on the same plate.

Young Larva.—Head large, pale brownish, pitted with many small depressions, which are darker, and ornamented with a number of brown spots, which are arranged as follows: four on the summit, two near together towards the front, and two further apart behind, below these a row of six, and a few minute ones lower down; the ocelli black.

Body.—Length, 2.5 mm.; pale in colour, with a dorsal, three subdorsal, a lateral, and a subspiracular stripe of brown. Second segment has about ten minute tubercles in a row, some smaller than others, and one on each side in the subdorsal region in advance of the row. On each segment, from 3rd to 12th, inclusive, there are six small tubercles above, arranged , and also several smaller ones on each side rather low down. All the segments except 2nd and 13th are divided by three transverse wrinkles.

On 10th several were seen to be swollen for first moult, but others continued to feed. On 12th ten were counted, and all but one seemed ready for first moult. In the evening one was seen to have passed the moult, several more passed on the 13th, and by the 14th all in sight had passed the moult, the average length of first stage being thus nine days.

After First Moult.—Length, 4.7 mm. Head rather large, exceeding the 2nd segment, brownish-green. Body tapering pretty evenly to anal extremity, which now terminates in two blunt points, as stated and figured by Edwards. The head is pitted as before and covered with clubbed tubercles. The body tubercles are very numerous, short, curved towards tail, and slightly clubbed. Towards the tail they get longer and are hardly clubbed. I could not discern any difference between those on the 2nd and 3rd segments. The tubercles are translucent brownish-green or pale in colour, and spring from brown spots. Body pale yellowish with a tinge of green. There is a dorsal stripe of dark brown, and a subdorsal and two lateral brown stripes, the lower being just above the spiracles. The next one above is wider than the others and diffuse on lower side. Spiracles are dark brown or black. The basal ridge is yellowish, and below it there is on the 5th to 12th segments, inclusive, a brown oblong spot, described by Edwards as a continuous stripe. Venter and prolegs brownish-green, speckled with brown dots; feet greenish.

Length of second stage about nine days.

On 21st July one was found to have passed second moult.

After Second Moult.—Length at rest, 7.8 mm. Processes innumerable. Shape as before, tail as before; head as before, very rounded, exceeding the second segment, light horn coloured, translucent, much pitted. Colour of body, yellowish-brown. A strongly marked dark brown or black dorsal stripe, bordered with creamy colour, three brownish lateral stripes, the upper one light brown, the middle one dark brown with a light brown shading below, the lowest one light brown and very little separated from the shading of the middle one. Spiracles small, ringed with brown. Subspiracular ridge strongly marked and below it a dark brown stripe. The sockets of the prop-legs and feet margined with brown. Venter, prop-legs and feet of same light horn colour as above, the feet and legs speckled with brown dots.

On 31st July one which had lagged very much was found partly past second moult, but dead; one still lingered, not having moulted; several were nearly ready for third moult. On 2nd August one was found just past third moult, and the second moulted on the 3rd.

Length of third stage was thus about twelve days.

After Third Moult.—Length, 11.46 mm. Edwards says .38 inch. Colour is greenish-brown, and the only difference I could see was that the upper lateral or subdorsal stripe is darker than before. The third larva moulted soon after 3rd August, and the fourth on 8th August and fifth on 13th August.

After third moult they increased very rapidly in size and became very plump, as I supposed, preparatory to hibernation, as Edwards described four moults, but I soon recognized that they must be about to pupate.

Mature Larva.—Length, 20.3 mm.; pale greenish-horn colour; tapers to both ends.

Head rather small, pale horn-colour, thickly and minutely pitted with brown. Dark brown dorsal stripe, bordered with creamy colour. The other stripes rather faded out and indistinct. Rather more than half way to the spiracles there is a creamy stripe margined below with brown and with a slight brownish atmosphere above. The spiracles are dark brown and very small, and just above them there is a pale creamy line. The subspiracular fold is strongly marked, but the dark line below it has almost disappeared and is only represented by a slight shading. Before

pupation the larva becomes of a rather dirty greenish-white colour, very plump, especially about the middle. The larva, when contracted for pupation, lies curved on its back among the grass without any attempt at spinning silk, just as Edwards figures it. First one pupated 15th Aug., the second on the 17th, the third on the 18th, the fourth failed to pupate and died, the fifth pupated on 29th.

The fourth stage was thus from thirteen to sixteen days.

Pupa, when first formed, is of a creamy colour, very similar to that of the grub of a *Tachina* fly when it has just emerged from the body of its victim before it contracts and hardens into the puparium. The brown markings appear in the course of an hour or two, and the description is then as follows :—

Pupa.—Length, 11.7 mm. Pale horn colour, streaked and spotted with dark brown; cylindrical; abdomen stout, conical, with a slightly curved, pointed tip. The abdominal segments are margined with brown, especially at the sides, and are also spotted with brown. The spiracles are orange. There are brown stripes in the interspaces of the wings, and the antennæ, tongue and feet-cases are also marked with brown.

The first pupa was seen to be black, and the wing markings showing on 27th Aug., and it emerged early on the 28th, and was a ♀; the one that pupated on 17th gave the imago, a ♀, on 29th; the one which pupated on 18th gave the imago on 30th, and the one which pupated on 29th Aug. gave the imago on 9th Sept.

The pupal period thus varied from thirteen to eleven days.

The average of the first three gives a period from oviposition to imago of from sixty-eight to seventy days.

The points in which my observations chiefly differ from those of Mr. Edwards are :—

First : As to the egg which Mr. Edwards describes as having thirty-five ribs, while my count gave in one case twenty-two and in another twenty-four, it was impossible for me to get all the eggs which I had into a position where the ribs could be counted, but I thought that two out of about a dozen should yield a fair average. It is true that there is variation in the number of ribs in the same species and even in the same individual, but the difference between twenty-four and thirty-five seems hard to account for.

Second : Edwards describes four moults, the larva hibernating after either second or third moult,

I think it quite possible that when the larva hibernates there may be a fourth moult, and it is probable that those of mine which completed their changes in one season had their stages hastened by being reared under more southerly conditions. Several of my larvæ fed comparatively slowly after third moult, as though trying to hibernate, but most of them died. The last was sent to Dr. Fletcher to see if he could carry it over the winter successfully, but it perished.

There can be no doubt of the accuracy of my observations, as I had only a few larvæ, which were under constant observation, and I preserved the cast faces, which give measurements as follows, according to the micrometer eye-piece of my microscope: 8, $12\frac{1}{2}$, $18\frac{1}{2}$, 28. These reduced to millimetres and decimals are as follows: .666, 1.041, 1.542, 2.333. As the faces were not of the same individual, but were simply taken at random from all those preserved, the measurements come as close to the theoretical progression as is to be expected.

I wrote to Mr. Willing to ask if he had ever noticed a second flight of *Epipsodea* at Calgary, as I thought it possible that there might be at least a partial second brood, but he replied that he had never noticed any such flight. Finding my experience so different from that described by Mr. Edwards, I consulted all the literature at my command to see if I could obtain any light on the questions of the normal number of ribs in the eggs and of moults in the larvæ of this genus, but with absolutely no success.

AELLOPOS TITAN (CRAM.).

In the CANADIAN ENTOMOLOGIST, Vol. XXIII., p. 41, Mr. Moffat records the capture of the above rare moth at Grimsby, Ont., and adds that it is possibly the only Canadian specimen in the country.

Another Canadian specimen of this visitor from the tropics was taken about four years ago at Cushing, P. Q., a village in the Ottawa Valley, not far from Lachute.

This specimen is now in my collection, and seems to be unusually large, expanding 2.6 inches. The discal spot of primaries is quite distinct. The transverse straight, whitish band only extends half across the wings, and consists of three rectangular spots, and the submarginal band consists of five large lunules. The terminal space is slightly paler than the rest of the wing, and there is no trace of the spots or bands.

Westmount, P. Q.

A. F. WINN.

THE GYPSY MOTH IN MASSACHUSETTS.

[A discussion on the work of its extermination, at the eighth annual meeting of the Association of Economic Entomologists, Buffalo, August 22nd, 1896.]

REPORTED BY A. H. KIRKLAND.

At the eighth annual meeting of the Association of Economic Entomologists, held at Buffalo, August 21st and 22nd, 1896, a part of one session was devoted to the consideration of the work of exterminating the gypsy moth in the Commonwealth of Massachusetts. The subject was presented for discussion by the President, Prof. C. H. Fernald, at the morning session of the second day. Prof. Fernald referred to the action of the Association at its Springfield (1895) meeting, and stated that at the legislative hearings of the past spring, held with reference to determining the size of the appropriation to be granted for continuing the work of exterminating the gypsy moth, no representations made by the Gypsy Moth Committee, the Director, or himself, carried a fraction of the weight that the endorsement of the Association afforded. The legislators recognized the Association as a body of eminent scientists, and accordingly valued the opinion of its members.

In speaking of the present condition of affairs brought about by the failure of the Legislature to provide sufficient funds for the continuance of the work in the most approved manner, the Professor stated that future action must be along one of three lines :

(1) To continue the work with a view to *extermination*. This can be done, but will involve a vast outlay.

(2) To attempt the *control* of the insect, but with no idea of its ultimate extermination. This means a great annual expenditure that must be continued indefinitely.

(3) To abandon the whole work, "let the insect spread at its own sweet will," and trust to the property owners to care for their own estates. Should this latter course be adopted, it would be impossible to say how long a period of time would elapse before the pest would spread over the whole of New England and into adjacent territory. The insect is now in a condition to spread rapidly through avenues of traffic, and its diffusion over the whole country would probably be a matter of comparatively short time.

The committee in charge, and those directly connected with the work, have been criticised because the importation of parasites has not been attempted. This, the Professor explained, had not seemed wise while the work has been carried on with a view to extermination, since

the latter condition involved the destruction of all large colonies wherever they occurred, and would thus prevent the successful breeding of parasites. Such insects would require the most favourable conditions in order to become acclimatized, and this would necessitate the preservation of large colonies of the gypsy moth as food for the parasites. Should the work of extermination be abandoned, a careful study of the natural enemies of the gypsy moth in its native home would be advised.

At the request of Professor Fernald, Director Forbush gave an account of the progress made in the gypsy moth work and its present condition. He said that when this insect, which was introduced into Massachusetts more than twenty-five years ago, first became seriously destructive, a commission was appointed by the Governor to "prevent its spreading and secure its extermination." This commission found that the territory infested by the moth was much larger than had been supposed. The commission was superseded the next season by another, which in a short time was abolished, and the work was then turned over to the State Board of Agriculture.

The work was begun under a grave misconception of the amount of territory infested. As soon as the State Board assumed the direction of the undertaking, it was found that the infested territory extended, not, as believed by the first commission, over a small and well-defined area, but, instead, over some thirty cities and towns. The size of the infested territory as considered by the first commission, compared with the actual area later found to be infested, was very aptly illustrated by the comparison of the size of a silver dollar with that of a broad-brimmed hat.

With a region of two hundred and twenty square miles to be examined and cleared of the moth, the appropriations made the first two years proved entirely insufficient to do more than to destroy the larger swarms of the insect and clear them from a few of the towns on the periphery of the region. The two years' work demonstrated, however, to those in charge that the moths could be cleared from any given territory provided ample appropriations could be secured to organize, equip and train a sufficient force of men. The season of 1892 was rather unfavourable for the multiplication of the moths, and so much progress was made during that year that ten towns appeared to have been entirely cleared of the moth. The committee in charge of the work believed the time had come to strike a decisive blow. The Director and the Entomologist went carefully over the ground and estimated the cost, recommending in their

report to the committee that a large appropriation be granted by the Legislature for immediate use. The Legislature cut down the estimates for the appropriation, and granted only one hundred thousand dollars. Thus the best opportunity in the history of the work was lost. During the past three seasons the meteorological and other conditions seem to have been particularly favourable for the increase of the gypsy moth, and no such favourable opportunity for its complete extermination has offered as was presented in 1892. From that time until the present, although large sums have been annually appropriated, aggregating altogether more than half a million dollars, each appropriation has been far less in amount than the immediate necessities of the work required, and each has been granted so late in the season that it has been impossible to accomplish the desired results. This ineffective legislation has been, no doubt, the result of an organized opposition on the part of those who do not believe in the possibility of extermination. Considerable opposition has come from farmers, people who are benefited, perhaps, more than any other class by the policy of the State in making appropriations for this purpose.

Many of the worst swarms of insects have been entirely exterminated, and the work has been so effectively done in most of the outer towns of the infested region that the moth has been cleared from these towns so far as careful inspection could determine. But during the present year, the appropriation having been delayed nearly six months, the caterpillars in the central towns hatched and became again somewhat generally distributed over the region, thus reinfesting some of the places originally infested and also originating new colonies.

Few moths have ever been observed outside the region found infested in 1891, except in one or two isolated localities, and all the moth colonies found since 1891, outside these thirty towns, had evidently been in existence for several years when discovered. None have been found at a distance from the infested towns. Since work was begun the present year the progress made has been very encouraging. The numbers of the different forms of the moth found this year have so far been much less than those found in 1895. No moths have been found in the extreme north-easterly towns, such as Danvers and Marblehead, and very few have been found in Lynn, a city which formerly had more than twelve hundred infested localities.

Mr. Forbush expressed a desire for information concerning the death of trees from defoliation by insects.

Prof. J. B. Smith inquired whether or not the infested territory had been reduced.

Mr. Forbush replied that the chief reduction had been made on the outside, but that many colonies had also been exterminated in the centre of the region. The greatest progress was made during the first and second years of the State Board work. There had been cases of re-infestation of "exterminated" territory from larvæ brought from the infested centre.

At the request of Prof. Fernald, Mr. Kirkland spoke briefly of the experimental work of the past year. He stated that two main lines of investigation had been followed: experiments with insecticides and the study of natural enemies. In conjunction with the chemist who prepared the compounds, a large series of arsenical preparations had been tested. Experiments with Paris green and correctives to prevent burning gave negative results. Sulph-arsenates did not give results superior to arsenites. Experiments with arsenite of lead versus arsenate of lead had shown the two poisons to be about equal in insecticidal properties. The former is somewhat heavier than the latter, and does not stay in suspension as well. The experiments with barium arsenate had already been described.

Of the few hymenopterous parasites taken, *Pimpla pedalis* and *P. tenuicornis* had been reared in small numbers from *Porthetria dispar*. The first brood of these insects attacks the *Clisiocampa americana*, and the second brood emerges in time to prey somewhat on *P. dispar*. The work on life-histories of the predaceous beetles had been carried out by a man especially detailed for the purpose, Mr. A. F. Burgess, and much valuable information obtained.

Many predaceous Heteroptera of the genera *Euschistus* and *Podisus* had been reared and studied by Mr. Kirkland, and many doubtful points in their life-history cleared up. These insects when emerging from their hibernating quarters attack the larvæ of the tent caterpillar, *Clisiocampa americana*, in great numbers.

The Japanese parasite of the gypsy moth had been received from Rev. H. A. Loomis, Yokohama, but the cocoons of the parasite were infested by a secondary parasite. Only a few of the primary parasites were alive when received, and these died without attacking gypsy moth larvæ ("enfeebled"). This Japanese parasite would be worthy of careful study should the work of exterminating the gypsy moth cease. The

experimental work of the Gypsy Moth Committee has suffered from the effects of the same shortsighted legislative policy that has hindered the progress of field operations. Mr. Kirkland pointed out that often the expenditure of a small sum in experimental research gave valuable results, and regretted that the experiments on the gypsy moth had been made to suffer from lack of funds.

In discussing the above remarks, Prof. A. D. Hopkins highly commended the good work that had been done in destroying the gypsy moth, but expressed the opinion that extermination would not be accomplished, owing to the lack of financial support on the part of the Legislature.

Prof. J. A. Lintner advocated the advisability of extermination, and stated that it was his opinion that if the State would grant sufficient funds, extermination would be accomplished. He thought the time had come when Massachusetts should be aided by the financial support of the National Government. He contrasted the action of the Government concerning the Rocky Mountain locust invasions with its present inaction as regards the gypsy moth. National support would also inspire the Massachusetts people with more confidence.

Dr. James Fletcher spoke in very flattering terms of the success in extermination thus far obtained, and of the value of the special report on the gypsy moth to entomologists in general. This book he considered would be an invaluable work of reference for economic entomologists.

He had been in the infested region twice and knew that the work had been well done, and this in spite of difficulties arising from insufficient means. In answer to a question by Dr. Fletcher, Mr. Forbush made a more explicit statement concerning the progress of the work and the conditions governing the same. He cited the case of the city of Lynn, where over one thousand colonies of the gypsy moth had been exterminated.

Dr. Fletcher suggested that the Association should give formal expression of its opinion regarding the attempt being made by the State of Massachusetts to stamp out this pest.

Prof. J. B. Smith stated that New Jersey devoutly hoped that the insect would be kept within its present domain, and offered resolutions commending the work already accomplished by the State of Massachusetts, and urging the continuance of the same, with liberal financial support.

Prof. F. M. Webster seconded Mr. Smith's resolutions, and the same were carried by a unanimous vote.

NEW SPECIES OF NOMADA AND CHYPHOTES.

BY T. D. A. COCKERELL, MESILLA, N. M.

The two following descriptions were intended to be included in articles discussing at some length the *Nomada*, spp., of New Mexico, and certain Mutillidæ; but poor health having caused these to be indefinitely postponed, the descriptions are presented herewith.

Nomada gutierrezia, n. sp.—♀. Length, 7 mm.; stout, ferruginous with cream-coloured markings. Pubescence practically confined to a slight hoariness around the bases of the antennæ, on pleura, on metathorax (except enclosed portion), on legs, and the hindmost half of the abdomen. Head considerably broader than long, face flat, punctures close on front and vertex, more sparse on face; lower margin of clypeus forming a slightly raised rim; mandibles dark at tips, with an obscure pale yellow spot near base; ocelli on a dark patch, closer together than the diameter of either; pale face-markings confined to a broad cream-coloured stripe on each side, extending from (but not on to) the clypeus to a short distance before the summits of the eyes, broadest at its lowest end. A small light spot behind each eye at the top. Antennæ ferruginous, with the flagellum becoming blackish; first joint of flagellum about as long as second and third together; second and third about equal. Mesothorax and scutellum with very large but not particularly close punctures, scutellum distinctly bilobed; enclosed space of metathorax bare, very minutely lineolately sculptured. Tegulæ shining, sparsely punctured, apricot colour. Hind border of prothorax, tubercles, oval spot on hind part of pleura, scutellum except a dark central shade behind, and postscutellum, cream colour. A small yellow spot also immediately in front of each anterior angle of scutellum. Legs ferruginous, a creamy dot at end of hind tibiæ, and line on first joint of hind tarsi. Claws very deeply cleft. Wings hyaline, with a fuliginous shade commencing along basal nervure, extending through the upper part of the first discoidal cell, all the submarginals and the marginal, darkening at the end of the marginal, and ending in a large suffused apical shade, between which and the third submarginal is a clear space. Nervures piceous, stigma ferruginous. Third submarginal cell narrowing more than half to marginal. Abdomen very finely and closely punctured; first segment with a creamy band, about twice as wide at sides as in middle; second segment with a creamy band, as narrow in middle as that on first, but rapidly widening laterally, where it is at least twice as broad as that on first. Third segment with a cream-coloured spot on

each side; fourth with a band, hidden by the overlapping third segment; fifth with a broad band. Apex with a fringe of dark hairs. Venter ferruginous, immaculate.

Hab.—Mesilla Valley, New Mexico, about a mile south-east of the Agricultural College, on *Gutierrezia sarothra*, var. *microcephala*. October 5, 1895.

Apparently nearest to *N. zebrata*, Cress., but differs by the immaculate venter, etc. Mr. E. Saunders remarks (in litt.) that in the European *Nomadæ* the first joint of the flagellum is generally extremely short, often scarcely visible. This seems not to be usual with our species.

Chyphotes mirabilis, n. sp.—♀. Length, about 11 mm.; head rounded, about as big as anterior part of thorax; eyes hemispherical or bean-shaped. Antennæ gradually tapering to a very fine point, scape stouter than flagellum, funicle hardly apparent. First joint of flagellum half length of second. Mandibles with a small tooth within. Maxillary palpi 5-jointed; labial palpi apparently 3-jointed. Thorax narrow, deeply constricted in middle, hind portion longest. Intermediate tibiæ with two spurs. Tarsal joints tipped with whorls of spines. Abdomen shaped much as in *Photopsis*, first segment rounded, its suture with the second deeply constricted, its base rapidly attenuate to a narrow petiole. Surface of abdomen with close shallow punctures, becoming subcancellate. Colour dullish chestnut-red, tips of antennæ darkened, tarsal spines black, tibial spurs dull white. The head and the anterior portion of the thorax are densely covered with appressed pale golden pubescence, on dorsum completely hiding the surface. Intermingled with this are a few erect black hairs. Remaining parts of the body visible, some sparse pale pubescence on sides of hind part of thorax, on legs, and sides of abdomen; hind coxæ with a small patch of dense pale pubescence, hind margin of first abdominal segment broadly but irregularly covered with silvery hairs, hind margin of second segment with a pair of silvery hair patches, overlapping third; and the same, less developed, on hind margin of third. In addition to the above, there are everywhere sparse erect black hairs, which are more abundant at the sides of the abdomen towards the tip.

Hab.—Mesilla Valley, N. M. One on campus of the Agricultural College, July, 1896.

I have given generic as well as specific characters in the description, as this remarkable insect may form the type of a new genus, or at least a subgenus.

A. A. A. S.

ENTOMOLOGY IN SECTION "F," BUFFALO MEETING.

The interest in Entomology at the Buffalo meeting of the American Association for the Advancement of Science was fully up to the standard of former years. Two days preceding the date of meeting — Friday and Saturday, August 21st and 22nd — were fully occupied in the reading and discussion of papers by the Association of Economic Entomologists. The entomological papers assigned to Section "F" were arranged to be read the first day of papers (Tuesday), and nearly the whole day was thus occupied. The following entomologists were present at the sessions of the Section: L. O. Howard, C. L. Marlatt, F. M. Webster, J. A. Lintner, Jno. B. Smith, A. D. Hopkins, E. P. VanDuzee, C. W. Hargitt, Jas. G. Needham, Agnes M. Claypole, and D. S. Kellicott.

The papers read are briefly summarized below :—

1. Dr. L. O. Howard, United States Entomologist, read a paper on the entomological results of the exploration of the British West Indies by the British Association for the Advancement of Science, detailing the steps by which this important investigation had been brought about and summarizing the results of the different papers which have been published since the beginning of the investigation. He eulogized the British Committee for its conception of the work and the liberality with which it has been carried on, showed the importance of the results so far achieved, and made a plea for the association of entomologists with scientific expeditions in this country, and for the close collecting of insects, which has apparently been heretofore considered as of less importance than the collection of higher animals and plants.

After discussion by Dr. Theodore Gill, in which he pointed out that the West Indies were not islands in a faunal sense, but parts of South America, etc., simply separated by narrow channels of water, the same author read the second paper.

2. "A Case of Excessive Parasitism."—He described in some detail the facts concerning the rearing of one hundred and twenty-seven specimens of six species and five genera of Chalcididae from the Lecanium scales on a twig of *arbor vitæ* received from Ottawa, Can.

3. "On Life Zones in West Virginia."—A. D. Hopkins detailed the work in mapping the life zones in the mountains of West Virginia. The paper was discussed at length by Dr. Smith, Dr. Lintner, and Dr. Howard. It was elicited that very much careful work in the line of the

paper remains to be done before the maps can be more than tentative. Dr. Smith called attention to the fact that the geological formations often mark sharp transitions in the distribution of insects and also in life histories. He cited the fact that on one border of a certain formation in New Jersey the elm-leaf beetle and codling moth are single-brooded and on the other double-brooded.

Dr. Howard called attention to the fact that locality labels by States were unreliable for West Virginia.

4. A fourth paper by F. M. Webster, entitled "Warning Colours, Protective Coloration, and Protective Mimicry," was read and discussed at length.

The paper treated of cases among insects where a species unarmed and in no way capable of protecting itself, was, to a certain extent, protected by its resemblance to armed species, or such as are known to be distasteful. Others, by their actions, mimicked the movements of certain other species, and were thereby mistaken for such as are inedible. The ground was taken that birds, after learning that certain insects were not fit for food, would shun any other insects appearing like these, wherever they might come in contact with them, even though at a different season of the year. There may be cases where one species mimics another, when the enemy has become exterminated and no protection is needed. Caution was enjoined against hasty and immature conclusions, as there is much to be learned in the matter, but facts should not be cast aside as mere coincidences when more information would enable us to push the problem to a point nearer a solution. That insects, especially, gain protection from their coloration and movements is assured, but much caution is necessary before conclusions are reached. The paper was illustrated by specimens.

5. "On the Variations of certain Species of North American Odonata," by D. S. Kellicott, was a brief study of certain of our common species. Attention was drawn to the fact that species were not always separated even by authorities in the group; that when distinct species are separated from their confrères by such very slight differences of structure and coloration it is necessary to carefully record the variations of even our commonest species. The species reported were *Enallagma carunculatum*, Morse, found in collections, until Morse pointed out its distinctness, under the label of *E. civile*, Hagen., and the Gomphines, *G. fraternus*, Say, and *G. externus*, Selys. The first was found to be in

Ohio very constant in size: abdomen, ♂ 27 mm., ♀ 27.3 mm.; hind wing, ♂ 19.9 mm., ♀ 21 mm. The postocular spots were found to vary from long, narrow, wedgy, connected, to short, ovate, disconnected. Other markings usually employed in descriptions were found to vary greatly. The superior appendages of the male were found to be constant in length compared with the tenth segment, and in pattern.

Gomphus fraternus and *G. externus* were studied by B. D. Walsh and the details and comparisons published in the *Proceedings of the Ent. Soc. of Philadelphia*, Volume II. In regard to the former he says there is no slender thorn in the vertical vesicle of the female. These the author found always present, to be long and slender, and to vary in colour between wholly black and wholly yellow. The yellow vitta on the hind femur of the female, claimed by Walsh to be a distinguishing character, was found to be present in about one-half the individuals and wholly wanting in one-fourth. In *externus* the spine of the vertex is present. It is a short, dark cone. The vitta on the posterior femur varies much as in *fraternus*. The conspicuous vitta on the ninth abdominal ring of *externus*, male, varies as follows: In about nine cases in ten it is normal; *i. e.*, extends the entire length of the segment, broad, and orange in colour; one in ten has it faint and narrow. An occasional male of *fraternus* has a similar faint vitta on nine.

In size both species were found to be exceedingly constant and larger than the measurements given by Baron de Selys. *Externus*: Abdomen, ♂ 40.3 mm. (average of ten); ♀ 39.3 mm. (average of three). Hind wing, ♂ 32.5 mm.; ♀ 34 mm. *Fraternus*: Abdomen, ♂ 36.8 mm. (average of ten); ♀ 37.2 mm. (average of ten). Hind wing, ♂ 30.9 mm.; ♀ 31.5 mm.

Other discrepancies were pointed out in Walsh's description of the female of *externus* (*consobrinus*) and a question raised as to the accepted conclusion that *consobrinus*, Walsh, is after all a synonym of *externus*, Selys.

6. A second paper was read by Dr. Kellicott, "On the Occurrence of Dragonflies in Ohio in 1896." The seasons of 1894 and 1895 were those of extreme drought. Ponds and streams went dry for weeks over wide areas. A dearth of Odonata was looked for in 1896. This has not been the case; on the contrary, there has been an extreme abundance. No species heretofore known to abound has been missed, whilst several not before noticed have occurred, widespread and numerous. It would

appear to follow that the nymphs may bury themselves in the mud and remain in the dry capsules for a long time unharmed until rains return. Cases were cited of *Diplax rubicundula* and *D. obtrusa* industriously ovipositing among the grass of a dried-up pond, and of *Lestis triangularis* ovipositing in plants in similar places.

Mention was also made of the capture of more Southern species in the Maumee Valley.

7. A valuable morphological paper was presented by Miss Agnes M. Claypole, of Wellesley, Mass., on "The Appendages of an Insect Embryo." The form used was identified as *Anurida maritima*, Guérin, and was collected under stones on the beach at Woods' Holl, Mass. It belongs to a wingless group of Insecta, the Collembola, and is the first form of the group as yet studied in microscopic sections.

The cleavage of the egg is complete, holoblastic, a character belonging to this group of insects only, all the others having central cleavage. The appearance of the appendages takes place very early, the antennæ being the first of the series; following the antennæ is a pair of very small appendages on the body segment, carrying what is well known to be the third brain segment. Behind these, the mandibles, 1st maxillæ, and 2nd maxillæ appear successively, in turn followed again by the thoracic appendages. All of these organs increase in size excepting the small pair on the third segment, which remain unchanged till the mouth-parts and antennæ have assumed almost distinctive characters. Then these small ones begin to grow as a ridge down each side of the three pairs of mouth-parts and finally form a wide platelike appendage enclosing the mandibles and second maxillæ entirely. In the adult the mouth-parts are known to be enclosed in a tube, or to be "drawn in," as the condition is usually described.

If, as is generally acknowledged, the insect antennæ are considered homologous with the first pair of antennæ of the Crustacea, a point of considerable interest is developed. The appendage of the third brain segment has been found in many insect embryos, but in all cases is a purely embryonic structure; it disappears before hatching. Among terrestrial Crustacea—the wood lice, for example—the second pair of antennæ is reduced to an extremely small size. Hence *Anurida* is an interesting form showing an insect in which the second pair of antennæ of the Crustacea is present, and functional in the adult; the function, however, is completely changed.

D. S. KELLICOTT,

Secretary Section F.

MISS G. E. ORMEROD.

It is with deep regret that we record the death of Miss Georgiana Elizabeth Ormerod, of Torrington House, St. Alban's, England, the elder sister of Miss Eleanor A. Ormerod, whose name as a distinguished entomologist is known throughout the scientific world. After several months of patiently-borne illness, she passed away on the 19th of August last, full of piety and good works, and justly esteemed and loved by all who knew her. She and her sister were each other's constant companion and fellow-worker, and each sought the other's counsel and aid in carrying out any plan of work in which she was engaged. Miss G. E. Ormerod's special studies were botany and conchology, and in the latter department she formed a large and valuable collection of shells, which she presented, a few years ago, to the Natural History Museum at Huddersfield. She was highly gifted as a linguist, and acquired an excellent knowledge of French, Italian, Spanish, and German, and was thus enabled to be of the greatest assistance to her sister in correspondence and the translation of foreign works of science. She is most widely known, however, by her remarkable talents as an artist, which were employed in the illustration of her sister's works, and in the production of a splendid series of diagrams in which are depicted a large number of the most important injurious insects in all their life-stages.

In addition to her scientific and artistic work, she devoted much of her time and means to benevolent objects, and carried out for many years, at her own expense, a system of distributing books of an entertaining and instructive character amongst the working classes.

Women of such a type are rare, and we cannot but deeply deplore the loss of this eminent Christian lady, who died at an advanced age, full of good works, performed in a most unobtrusive manner; richly endowed with intellectual and artistic talents, which she largely used for the benefit of others; always happy and cheerful in her daily domestic life; kind, hospitable, and sympathetic; ready to help all who deserved her aid and to give wise counsels to those who sought them from her.

To her sister—her life-long colleague—the loss is beyond what words can express. We can only venture to offer to her our heartfelt sympathy and our earnest wish that she may have grace and strength to endure so heavy a blow.

C. J. S. B.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting was held in London, on the 21st and 22nd of October, when the following were elected officers for the ensuing year:—

President—J. W. Dearness, London.

Vice-President—H. H. Lyman, Montreal.

Secretary—W. E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors : Division No. 1—James Fletcher, LL. D., Ottawa.

Division No. 2—Rev. C. J. S. Bethune, D.C.L., Port Hope.

Division No. 3—Arthur Gibson, Toronto.

Division No. 4—A. H. Kilman, Ridgeway.

Division No. 5—C. G. Anderson, London.

Ontario Agricultural College—Prof. J. H. Panton, Guelph.

Librarian and Curator—J. A. Moffat, London.

Auditors—J. H. Bowman and R. W. Rennie, London.

Editor of the Canadian Entomologist—Rev. C. J. S. Bethune, Port Hope.

Editing Committee—Dr. J. Fletcher, Ottawa ; H. H. Lyman, Montreal ; Rev. T. W. Fyles, South Quebec ; James White, Snelgrove.

Delegate to the Royal Society—J. D. Evans, Trenton.

Committee on Field Days—Dr. Wolverton ; Messrs. Hotson, Balkwill, Saunders, Anderson, Rennie, Bowman, Elliott, and Spencer, London.

BOOK NOTICES.

A LIST OF THE BUTTERFLIES OF SUMATRA, with especial reference to the species occurring in the north-east of the Island. By L. de Nicéville and Hofrath Dr. L. Martin. Calcutta. Reprinted from the Journal of the Asiatic Society of Bengal, 1895.

This list of seven hundred and fifty-six species of butterflies taken in a limited portion only of the great Island of Sumatra, gives one some idea of the wealth of the insect fauna in tropical regions. In a very interesting introduction the authors give a brief description of the Island, which is nearly as large as France and is bisected by the equator, and relate the difficulties that have to be surmounted in the formation of a collection of its butterflies, which can only be effected by employing natives, who have first to be taught and trained for the purpose. Dr. Martin lived for thirteen years on the Island and has thus been enabled to add very interesting notes on the distribution, scarcity or rarity, habits, season of occurrence, etc., of a large number of species. One may, therefore, open the list anywhere and find not a mere record of names, but highly interesting details regarding the butterflies. As might naturally be expected, the preparatory stages of the majority of the species are as yet unknown.

A LIST OF THE BUTTERFLIES OF SIKHIM, by Lionel de Nicéville, F. E. S., etc. Calcutta: from the Gazetteer of Sikhim. Printed at the Bengal Secretariat Press.

Probably no part of the great British Empire of India and its tributary States has been so fully explored by the collectors of butterflies as the country of Sikhim, which includes the famous health resort of Darjeeling, about 7,000 feet above the sea, on the slopes of the Eastern Himalayas. Consequently the author is able to record in this list no less than six hundred and thirty-one species, which he considers a near approach to the maximum number that can be discovered. Certainly it is a goodly number, and one hard to be realized by a dweller in these northern and much less luxuriant regions. And what splendid creatures they are, with their gorgeous colouring and infinite variety of shapes and hues. Nearly fifty species of Papilios alone are recorded, and more than one hundred and fifty Lycænidae, the greater number of which belong to genera that are entirely unknown to us here.

CRITICAL REVIEW OF THE SESIIDÆ FOUND IN AMERICA NORTH OF MEXICO, by William Beutenmüller, pp. 111-148, Bull. Am. Mus. Nat. Hist., VIII., 1896.

The writer of the present brief notice of this excellent paper on the *Sesiidæ* desires to call attention to the very careful work of Beutenmüller on the clear-wings and the necessity for this work which has arisen from the uncritical publications of preceding authors. It appears, for instance, that our *S. lustrans*, a species well distinguished by antennal peculiarities, has been five times the subject of new descriptions by the late Mr. Hy. Edwards, whose species are very properly reduced, as appears from Beutenmüller's studies. The name hitherto used for this species itself must, it seems, give way to *bassiformis*, Walk., described from a type in poor condition. Beutenmüller is quite correct in calling attention to the particular necessity in this group for good material from which to describe. The want, perhaps, of such material led Mr. Edwards to describe *S. rutilans* six times over. A large number of sexual determinations by Mr. Edwards are corrected by Mr. Beutenmüller, so it seems hardly possible for anyone to have worked with less judgment. The list of the clear-wings in the New York Check List was drawn up, with the rest of the list, by the writer of the present lines, who at the time merely sent the last proof to the late Mr. Hy. Edwards for his revision. Mr. Edwards added, in explanation, the two foot-notes on page 12 and signed these, and made one or two changes in his names for genera on page 11. The writer is also responsible for the list of the clear-wings, since he originally wrote the same, and not Mr. Edwards. The explanation is here given, as the list has been erroneously alluded to as the work of Mr. Edwards. In the Philadelphia list the New York list is generally copied, but *lustrans* is wrongly given to Mr. Hy. Edwards, and an implication is conveyed in the preface that Mr. Hy. Edwards was the author of the list of the clear-wings, which is here corrected. The writer trusts that Mr. Beutenmüller will continue his studies and that lepidopterists generally will help him in every possible manner. It is a matter of great satisfaction that Mr. Beutenmüller's timely work is also of such good quality. The writer would merely reclaim his *Sesia pictipes*, which is also given to Mr. Hy. Edwards, on p. 134, and draw attention to the excellent description of the habits of this species given by the late Dr. Bailey in the pages of the *American Entomologist*.

A. RADCLIFFE GROTE, A. M.

CORRESPONDENCE.

"DIE SATURNIIDEN."

SIR,—In comment upon my friend Dr. Dyar's kind notice of my classification of the *Saturniides*, I would say that I believe the stinging spines of *Hemileuca* and *Automeris* may have developed along different lines from an initiatory existence in a common ancestor. I place, therefore, the origin of these groups lower down, approximating, in my "tree," *Hemileuca* seems to me to have differentiated from the lower and primitive type (which latter is *Agliid* and has retained more of the *Tincides* characters) by the achieving of the Saturniid character of the forking of IV, and IV₂. This character is of the first importance and indicates the original divergence of the primitive group. In my "tree," I show by the relative heights the relative specialization of the subfamilies. With regard to *Aglia*, it does not seem to me to be necessary that the larva should have reacquired, but merely retained, the anal tubercles which have become lost in *Citheronia*. The latter is a degenerate type. In my "tree," I have carried *Citheronia* beyond the base of the *Aglia* stem, to show its independent devolution; but only a little way beyond, because, in a vertical view, *Citheronia* represents the lowest Saturnian form, retaining vein VIII, which both *Aglia* and *Automeris* have lost. I place *Automeris* higher than *Hemileuca*, which Dr. Dyar has not noticed. *Automeris* and *Aglia* are more specialized in other directions, but have retained the primitive location of IV₂. All these points have been considered in my "tree."

A. RADCLIFFE GROTE, A. M.

RARE BUTTERFLIES.

Euptoieta Claudia.—Toronto, 1893 (am not sure of month, but think I took it in July).

Libythea Bachmani.—Caesarea, 12th August, 1896.

Satyrus Alope.—Niagara Falls, Canadian side, 14th July, 1896.

Colias Caesonia.—Toronto, 13th, 20th, and 27th June, 1896. Fairly common.

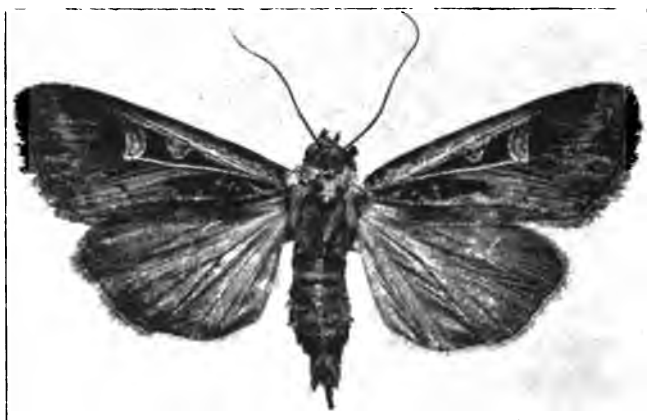
Papilio Ajax.—Toronto, 27th June, 1896. Saw several specimens, but only took the one. Saw first one on 14th June.

Pieris Oleracea.—Æstiva—Caesarea, 12th August, 1896.

ARTHUR GIBSON, Toronto.

Mailed November 3rd.





AGROTIS SUBGOTHICA, HAWORTH.

The Canadian Entomologist.

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No. 12.

THE AGROTIS SUBGOTHICA OF HAWORTH, AGAIN.

BY M. V. SLINGERLAND, CORNELL UNIVERSITY, ITHACA, N. Y.

In the CAN. ENT. for November, 1895 (Vol. XXVII., 301-307), I discussed all the evidence then accessible to me in regard to the identity of this insect. According to Prof. J. B. Smith, our American authority on American Noctuids, I showed "very conclusively that *subgothica*, Haw., is correctly used for our American species" (CAN. ENT., XXVIII., 4). However, Mr. J. W. Tutt, who has written much about British Noctuids, in an opinionated reply (CAN. ENT., XXVIII., 17), tries to prove that Haworth described a variety of *tritici*, a well-known European (not an American) insect. After a careful study of several authentic specimens of *tritici*, representing nearly as many varieties, from Dr. Staudinger, and after considerable correspondence with both English and American lepidopterists who are familiar with *tritici*, I became convinced that the species, in any of its numerous variations, never approaches near enough to what Americans have called *subgothica*, Haw., to be easily mistaken for the latter; their antennæ are quite different structurally. But Mr. Tutt states: "I can match exactly the specimens which Stephens figures, and Humphrey and Westwood copy, with undoubted genuine specimens of *Agrotis tritici*." Naturally, I was anxious to see one of these specimens, and, under the circumstances, I anticipated that a request to examine one of them would be readily granted. My first polite request remaining unanswered, I wrote a second time, but, as yet, Mr. Tutt has not even replied to either request. The above facts, and especially those which follow, I think demand that Mr. Tutt publish a photographic illustration of one of these specimens of *tritici* var. that it may be compared with the figures on my plate in CAN. ENT. for November, 1895, and especially with the two on the plate accompanying this article.

The following extracts from an interesting and valuable letter, written in response to several of my queries, by one of England's most respected lepidopterists, will throw much light on some obscure points and straighten out some of Mr. Tutt's misconceptions: "Stephens's and Wood's figures

seem to me to be made from a specimen, probably from the same specimen, of genuine *subgothica* of American writers. Humphrey's figure possesses the curious character, so conspicuous in *subgothica*, of an oblique pale stripe running from the median nervure immediately below the stigma. This is curious, because no tendency toward such a marking shows itself in the varieties of *tritici*."

"Mr. Raddon, who was mentioned as the person spoken severely of by Doubleday, was a respectable gentleman, an engineer, living at Bideford, on the west coast of Devonshire. He is famous in English lepidopterous history as the discoverer of *Deilephila euphorbia* in the larval state in numbers on some extensive sand burrows near Barnstaple. Bideford and Barnstaple are on opposite sides of the estuary of the Taw and Torridge; and from these two far-western ports extensive trade was carried on with America back to the days of the buccaneers and Sir Francis Drake. Consequently, my firm belief is that these and other American insects arrived there among timber or other produce, and naturally enough were picked up by Mr. Raddon as genuine 'Britishers'."

"I have written about Mr. Raddon to perhaps our oldest living collector, Mr. S. Stevens. He replies: 'I suspect that I am the only living entomologist who can give you any information about the late Mr. Raddon. Between 1837 and 1844, I used to meet him occasionally at the meeting of the Entomological Society, when he came up to London and brought a few of the insects that he had bred and captured. He died in the spring of 1848. I happened to be staying at Ashburton, South Devon, in August that year, and on receiving a letter from my brother, went to Bideford to see to packing up the collection, which was sold in October of that year.' Mr. Raddon was believed in then, and probably with justice. Was Raddon a collector as early as 1810? Yes, his first capture of *D. euphorbia* was in 1806, his largest haul of it in 1814."

"There is no reason to suspect that Haworth knowingly described as British any species which was not so, but unwittingly he certainly did. It is not possible always to sift out a statement, and there were collectors then who were willing to astonish their friends with insects that they certainly had not captured. I think that this does not apply to the original specimens of *subgothica*."

Thus, contrary to Mr. Tutt's surmises (pp. 17 and 21 of his paper), Mr. Raddon began collecting insects before 1810, when Haworth described *subgothica*, and until after 1829, when Stephens wrote. It is not impossible,

then, that Haworth's material came from the same source as Stephens's. On page 22 of his article, Mr. Tutt tries to show that the specimen of *subgothica*, Haw., of American writers, found by Mr. Barrett in the old Burney collection, was not likely to have been obtained by Mr. Burney in Haworth's time. However, Rev. R. A. Burney, who was born in 1775 and died in 1836 (three years after Haworth's death), was an ardent collector of insects for 30 years. His collection went to his son, Mr. H. Burney, who continued to collect for over 30 years. It was the latter Burney who died in 1893, but the specimen of *subgothica* recently found by Mr. Barrett (Ent. Month. Mag., XXV., 223) originally came, as he distinctly states, from the collection of the elder Burney, who *was* a contemporary with—and could have and did, Mr. Barrett says, correspond with—Haworth. In regard to the Burney collection, one of England's most noted lepidopterists writes me: "To call his collection a 'scientific lie' is worthy of the person who wrote it. The vast majority of his insects were genuine enough. A few of doubtful nativity were in the collection, but he had removed the most glaring species which had been imposed upon him, and, I think, destroyed some of them."

The above facts show that there could have been and that there was at least one (Haworth himself states he had seen his species in three museums or collections)—Burney's—specimen of the *subgothica* of American writers in English collections in Haworth's time; as Mr. Raddon collected before 1810, Stephens's specimen might also have been one of those seen by Haworth. In the light of the above facts, and especially in connection with what is to follow, it would seem that Mr. Tutt's sarcastic remarks in the closing sentence on page 22 and in the first sentence on page 23 (CAN. ENT., XXVIII.), might equally as well be applied to his own arguments in this discussion; but sarcasm is not science nor logic.

I consider myself fortunate in being able to draw most of my information from English sources, for I thus escape Mr. Tutt's allegation that no American entomologist had or has the slightest knowledge of the British Noctuids. As a final argument in support of my claim that Haworth's *subgothica* is an American insect and not a variety of the European *tritici*, I have to offer a British picture, shown in the lower half of the plate. This photograph was taken by Mr. Gepp, in the British Museum, under the direction of Mr. A. G. Butler and Mr. C. O. Waterhouse. It purports to be a likeness (twice natural size) of Haworth's

original type specimen of *subgothica*! Its authenticity is vouched for by Mr. Butler in the following letter to the writer:—

"Mr. Waterhouse suggested to me that as Stephens purchased part of Haworth's collection, it was possible that the original type might be in Stephens's collection *now*. I thought it hardly probable, for the very reasons urged by yourself; but *there it is*, or at any rate a specimen labelled in Haworth's style and in his writing.

"All of Haworth's types are ticketed in the same way (note the peculiar triangular label and the printing of the name in the picture on the plate). Of course, italic writing is much alike whoever does it, but I should do it differently from Haworth [here Mr. Butler gives his style]. Old Smith, in his labels, differed again [a sample of Smith's style is here given]. In Haworth's label the *s* and *b* are the most distinctive features. I have no doubt that the Stephensian specimen is Haworth's type.

"The type of *subgothica* has a strongly pectinated antenna (see the picture), but examined through a lens this antenna is clearly seen to be glued on to the right eye. It does not belong to the specimen, which is undoubtedly identical with *A. tricos*a, Lintner.

"Stephens's figure cannot have been made from Haworth's type; indeed, it is stated to have been drawn from a specimen in the possession of Mr. Raddon. Collectors were easily gulled in the days of Stephens, and doubtless anybody who cared to pay for Haworth's species to complete his '*British*' collection could get something quite near enough to represent it. Stephens's figure is evidently taken from a specimen of the same species as *Feltia ducens*, Walk. (All recognize this as equal to the *subgothica* of American writers.)

"We have a whole drawerful of Haworth's types, and in every instance the labels are cut in the same peculiar way (see figure); also in every label on which the letters *s* and *b* exist they are formed precisely in the same manner. There is, therefore, not the least doubt that the specimen in Stephens's collection is the type and that *A. tricos*a, Lint., must be called *subgothica*, Haw."

As Dr. Lintner, the author of *tricos*a, has kindly given me a type specimen of his species, I am able to present, in the upper half of the plate, a picture of it, twice natural size, for comparison with the picture of Haworth's type of *subgothica*. Both Dr. Lintner and Prof. Smith agree that the photographs represent insects of the same species. I think a careful study of Guenee's descriptions, and especially of his figure of

jaculifera, will show, what most lepidopterists admit, that he had three species before him, from which he deduced a type description and two varietal descriptions.

Thus, to summarize, I believe that the evidence given in and brought out by my former paper, with the new facts brought out in this communication, demonstrates beyond any reasonable doubt the following final synonymy for these three much-discussed species :—

Feltia subgothica, Haw.

triosa, Lint.

jaculifera, var. A, Gn:

Feltia jaculifera, Gn.

subgothica, of Stephens, Wood, Humphrey, and all American writers.

ducens, Walk.

herilis, Grt.

jaculifera, var. B, Gn.

FURTHER ADDITIONS TO MY 1894 LIST OF WINNIPEG BUTTERFLIES, WITH NOTES FOR SEASON OF 1896.

BY A. W. HANHAM.

Neonympha eurytris, Fab.—Two. June 23rd and 26th. Both captured in Elm Park, near the City. These specimens differ somewhat from some I have taken near Quebec City. They are also larger.

Carterocephalus mandan, Edw.—Two. June 18th and 20th. The first in Elm Park.

Pamphila hobomok, Harr.

var. *pocohontas*, Scud. Several in Elm Park, June 18th to 23rd.

The spring was a wet one and the early summer not much better, notwithstanding which this season has been a richer one for diurnals than last. Several visits were made in June and early in July to the locality where the *Phyciodes*, sp., was found in 1894, but nothing but *tharos* was seen.

Pyrameis atalanta, Linn.—This butterfly was unusually abundant here early in the season.

Limenitis arthemis, Dru.—Quite plentiful.

Debis portlandia, Fabr.—This beautiful insect was very abundant throughout the district, and especially so in Elm Park from June 26th to July 3rd (in perfection), and I even took a fine specimen in my back kitchen.

Satyrus nephele, Kirby.—The form *Boopis* occurs here.

Colias interior, Scud.—A fresh specimen taken near Bird's Hill on July 8th and a second seen.

Colias eurytheme, Bdv.—Very abundant this season from beginning of August until middle of September.

Papilio asterias, Fabr.—A worn ♀ near Bird's Hill on June 29th. No *P. turnus* noticed in the district since 1894.

Pamphila metacomet, Harr.—One. Bird's Hill, July 7th.

Amblyscirtes samoset, Scud.—June 18th. Abundant in Elm Park. Examples not very fresh.

Eudamus tityrus, Fabr.—One seen June 29th near Bird's Hill. I find this a very difficult thing to net.

On July 9th I went to Brandon, Man., for a few weeks and enjoyed some good collecting, but did not get out often for butterflies.

On July 26th and August 2nd, *Argynnis Cybele*, *Cipris*, *Lais* and *Bellona* were seen in abundance. *Colias eurytheme*, var. *eriphyle* and *Keewaydin*, were very common everywhere during my stay, and on August 2nd I captured a fine ♀ (albino).

Euptoieta claudia, Cram.—One. August 2nd. In fine condition.

Thecla titus, Fabr.—Plentiful in one locality on the prairie August 2nd. No bush near at hand.

Lycana melissa, Edw.—Occasional. July 13th to August 2nd (♂s).

Pieris protodice, Bd.-Lec.—Several taken at Brandon are in the collection of Mr. H. W. O. Boger.

Papilio asterias, Fabr.—One. August 2nd.

Thymelicus garita, Reak.—Common. Worn specimens on wing as late as August 2nd.

Pamphila manitoba, var. *assiniboia*, Lyman.—August 3rd. One (fresh), at rest on a yellow flower in the evening (♂).

A REPLY TO PROF. SMITH.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

With regard to *Mamestra comis*, the whole question as to the setting of the type has been introduced by Prof. Smith, and I submit that this has nothing to do with the matter. I have merely shown that Prof. Smith's statement that the type of *comis* was "typical *olivacea*, but so set as to make it appear differently marked," etc., is inaccurate and impossible, as my description refers to colour and marking, and these cannot be produced by any freak of setting. As I failed to notice any peculiarity of setting in my type, it is probably not very obvious, and as now described by Dr. Smith, must be very slight. I call further attention to the fact that in colour and marking the description of *circumcincta* agrees well with mine of *comis*. I believe, therefore, it possible that *circumcincta* is *comis*. I do not assert it—I have not seen the type of *comis* since the seventies—but I think it possible, nay, probable. Mr. Beutenmüller writes me that the type of *comis* differs more from "typical *olivacea*" than the type of *circumcincta* does. I want these types examined by some competent person who can settle the matter as to whether *comis* is a variety of *olivacea* or not, and what the standing of *circumcincta* really is as compared with either. That *comis* is not "typical *olivacea*" seems now virtually admitted by Dr. Smith, and this is in reality all my contention, and that no amount of abnormal setting can produce differences in colour and marking. This closes my case as to *Mamestra comis*.

Now, as to the type of *Agronoma*, which is *crassa*. If *crassa* agrees with the type of *Porosagrotis* I am glad to hear it, and we shall get a little more light into the matter. The reason I wrote that the front was roughened and tuberculate was that I felt it with a pin's point. My microscope I left behind in America, and there is none in the museum here. I could not distinguish, with the pin, between tuberculate and roughened. *Crassa* does not belong to *Carneades*, because the antennæ are pectinate, and in my opinion the structure of the antennæ offers points of generic value. I have therefore not been able to compare *Feltia* and *Agronoma* as closely as I should have liked; first, because I had no species of the former; secondly, no microscope. But the work of bringing the groups of North American *Agrotis* into correspondence with the European progresses, nevertheless, as we see. That *Feltia* should not be represented in Europe seems not likely, since Haworth's name *subgothica* is held by Mr. Tutt to represent a variety of *tritici*, by Dr. Fitch to be *jaculifera*. In a little

while I hope to get it all straightened out, and I am glad that my original proposal to separate first the species of *Agrotis* with unarmed tibiae has been adopted in his revision by Dr. Smith. I may say, in conclusion, that it is the property of all changes in the synonymy, whether proposed by me or by Prof. Smith, that they should be verified and that they are subject to examination. I have been showing reasons why some of Prof. Smith's changes are not to be followed.

A MEXICAN ALEURODICUS.

BY T. D. A. COCKERELL, MESILLA, N. M.

Aleurodicus Dugesii, n. sp.—Length, 1 $\frac{2}{3}$ mm.; length of anterior wing, 2 $\frac{1}{4}$ mm.; its greatest breadth nearly 1 $\frac{1}{2}$ mm. Pale grayish-ochreous, covered with white meal, abdomen beneath shining silvery. Wings white; upper wings iridescent, with markings similar to those of *A. ornatus*, but very pale gray and quite different in detail. There are four gray bands crossing the wings, of which only the third and fourth are joined by a longitudinal band. The first (basal) band bends abruptly inwards after crossing the main nervure, which branches so near the base of the wing that there are practically two nervures, the first gray band failing in the angle between them, but strong again beyond the second. Second gray band broad as far as the first nervure, just beyond it interrupted broadly, but continued as a large, nearly circular, gray patch, the greater part of which is above the second nervure, and passing thence as an oblique narrow band to the margin. Third band resembling the second as far as the first nervure, which it meets at its fork; after that failing, but reappearing strongly a little way down the lowest branch of the nervure and thence passing downwards, becoming very faint. Fourth band broad, passing across the end of the fork, bent inwards, joining the continuation of the third band after the break, itself forking at its lower end. The curve of the fourth band leaves a white apical area in which there is a gray spot. There is also a gray spot at the tip of the second nervure.

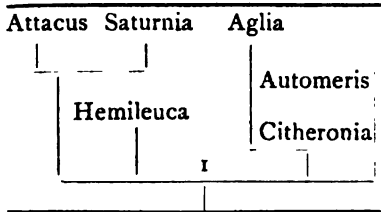
The pupæ occur on the under sides of the leaves and are of the usual type—oval, flat, pale ochreous, with white mealy powder.

Habitat.—Guanajuato, Mexico, on *Hibiscus rosa-sinensis*. Sent by Dr. Alfred Dugès in great quantity. Dr. Dugès writes that it is also found on the large-leaved *Begonia* and other plants, and it does not appear to do them a great deal of harm. It is the first *Aleurodicus* described from Mexico, and is most nearly allied to the Jamaican *A. ornatus*, Ckll. The genus now includes five species, all neotropical except the U. S. *A. asarumis* (Shimer, 1867).

NOTES ON THE PHYLOGENY OF THE SATURNIANS.

BY HARRISON G. DYAR, PH. D., NEW YORK.

Mr. Grote's remark (CAN. ENT., XXVIII., p. 294) that the stinging spines of *Hemileuca* and *Automeris* may have been separately evolved is not in accordance with my views, and I wish to compare his genealogical tree of the Saturnians with the larval characters more at length than was possible in the review of his paper, "Die Saturniiden." I reproduce first his tree: At 1 there is a dichotomous division, the genera on the right having vein IV_2 in the middle of the cell or but slightly moved (generalized);

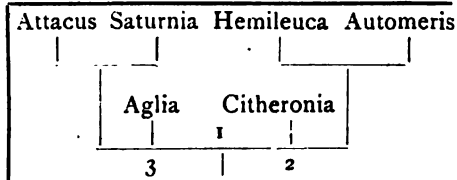


those on the left with vein IV_2 considerably moved toward IV_1 . It is not proved that this movement of IV_2 took place only once in the Saturnians, but it is so assumed, and the construction of the tree depends upon the assumption.

Next I present a tree founded on larval characters, using the same generic types. At 1 is a dichotomous division, the larvæ on the right retaining the unpaired tubercle on joint 13 and losing those on the anal plate; on the left losing the unpaired tubercle and retaining the pair on the anal plate.

At 2 is another division, the two genera above acquiring stinging spines, while *Citheronia* remains without them.

At 3 the stem of *Attacus-Saturnia* acquires many haired, reduced tubercles, while *Aglia* retains the single haired primitive condition and degenerates.



A comparison shows that these two trees are contradictory, the position assigned to *Aglia* and *Hemileuca* being almost exactly transposed. Yet, if rightly interpreted, there should be no contradiction between larval and imaginal characters.

If Mr. Grote's tree is correct, *Aglia* must have reacquired tubercles on the anal plate, because it is derived from the stem of *Citheronia* after *Automeris* was thrown off, and neither of these genera possess these tubercles. Likewise, *Hemileuca* has independently lost these tubercles, unless we suppose that originally they were not present, but were acquired separately by *Attacus-Saturnia* and *Aglia*. This can not be, however, as

the tubercles are primary, not recently developed structures. Automeris and Hemileuca must have separately acquired stinging spines and not from "an initiatory existence in a common ancestor," as Mr. Grote puts it, because there is no such condition in Aglia or Citheronia, which are placed between them, nor any evidence that these genera are derived from wart-bearing ancestors, a condition necessary for the multiple spine formation. I regard these conditions as very improbable.

If my larval tree is correct, Aglia has remained more nearly in the primitive condition in regard to vein IV_2 in that this vein is only slightly moved toward IV_1 . Yet, it is somewhat moved, which weakens Mr. Grote's point (see the fig. Die Sat., p. 19, fig. 8). Hemileuca has followed out the same process separately; derived from a common stem with Automeris, vein IV_2 has moved close to IV_1 separately from the Attacus branch. Hemileuca is separately specialized in this respect.

Some collateral evidence may help to a conclusion. If these moths be separated on the position of the wings in rest, the wings folded over the back in the shape of a roof or with the upper faces together (as in butterflies) a tree results like the larval one. In the hind wings there are two anal veins in Hemileuca and Citheronia, the rest have one. A tree constructed on these characters (which I believe to be as good as the one selected by Mr. Grote) would be different from either. To reconcile it with my tree, it must be supposed that the left-hand branch had lost one anal vein, while Automeris on the right branch also lost it, but separately. To reconcile it with Mr. Grote's tree, three separate losses of anal vein must be supposed, viz., in Automeris, Aglia, and Attacus-Saturnia. My view is here the simpler.

As to the pectinations of the antennæ in the male, those of Hemileuca only have simple branches; in the female only Attacus-Saturnia have them double. Mr. Grote may suppose that the original ancestor had single pectinations in both sexes, retained in Hemileuca; the right branch acquired double pectinations in the male, while Attacus-Saturnia separately acquired them in both sexes, which seems improbable.

In my larval tree the ancestor must have already possessed double pectinations in the male, which became transferred to the female also in Attacus-Saturnia, but were lost by degeneration in the male of Hemileuca. It is true that this supposition can also be applied to Mr. Grote's tree, so that we are not greatly benefited by the consideration. Other characters will have to be compared; but this I will leave to Mr. Grote, with the

hope that he will examine the matter thoroughly. I believe he will find that the true natural classification is not far from that which I have indicated on larval characters.

Finally, this is perhaps as good a place as any in which to protest against Dr. Skinner's remarks in a recent number of the *Journ. N. Y. Ent. Soc.* Dr. Skinner says: "I may say right here that I believe the imago the culmination of nature's efforts, and that while studies of transformations are most valuable, they will not solve the problem of specific difference or identity." This is not the view of a careful student of the subject, but reads like an excuse for neglecting studies of the early stages. As if the *larva* were not often the "culmination of nature's effort," as in *Apatela* or the *Limacodidæ*, or as if the forces determining the struggle for existence must always impinge most strongly on the same stage in all species.

DESCRIPTION OF TWO REMARKABLE ABERRATIONS OF *COLIAS PHILODICE*.

BY DWIGHT BRAINERD, MONTREAL.

We were fortunate in taking a very peculiar pair of *Colias philodice* this summer. They were captured at Edgartown, Mass., in a little salt marsh, August 10th and 14th respectively, and, though hatched during the hot wave, we believe are blood relations — part of a sport brood.

Many specimens were examined at the time, but no other departures from the type found.

Number one is a male very similar to the melanic variety figured by Mr. W. H. Edwards on Plate III. of *Colias* in *Butt. N. A.*, second series. The colouring on trunk and appendages is normal, except that pile on dorsum is mouse-gray, the collar a more decided brick-red than usual, and the yellows, where present, match the deep chrome on wings.

When caught, the whole upper surface (with exception of a dusting of yellow on costal margin of the primaries and a pallid green-white strip on the secondaries from costal margin to and following the radius for three-quarters of its length, gradually becoming obsolete) was a deep bottle-green. On drying, the marginal bands, both wings, appeared as a slight, but uniform, reddish-purple stain, the indentations regularly lunulate, and the nervules came prominently out in dull black lines.

The spot on discal vein of fore wings is present and distinct, but a dark blotch replaces the usual orange patch on secondaries. The rosy marginal line is as in type.

Our plunder this season was all attacked by pests, necessitating a severe cyaniding. Much of the brightness in this butterfly was lost, the colour now resembling the brown leaf-green of oak trees late in August.

Scales on the under side are very heavy, there being no suggestion of a band; the extra mesial spots on primaries are almost wanting, and the general ground colour is a deep chrome. A thick daub of this paint from a good box duplicates it exactly.

On the basal half of the disk in secondaries there is a suggestion of green, and extended from that portion of the primaries covered by the lower wings when at rest, which is of the pallid hue mentioned above, nearly covering the outer half of discal cell, thence interspacing the media and cubitus to the mesial spots, from which it bends sharply to the outer angle, reaching the margin at lower branch of cubitus, there is an overwash of black. This is deepest at its inner border and curiously shaded as it blends with the chrome. The whole lower surfaces, with their bright tips and bold opaque colours, are very handsome.

Number two is a female, pallid above, like a white female, except that the black margin reaches from the discal vein, on the costal side follows the radius, joining margin at its first branch and posteriorly defines the media as far as the border. The outer portion of disk and the costal margin on primaries are more or less splashed with dark scales, while on secondaries the marginal band is only indicated by a dusting on edges of the veins.

Underneath the spots are much exaggerated. On the primaries they appear as large triangular black stains, with apices reaching further and further towards the base until between radius and media they touch the discal spot. On the lower wings this stain is ferruginous, shading to green, and practically covers the disk. The unusual size of these spots outlines a white marginal band, the distinctive feature of the specimen in question.

THE ACADEMY OF SCIENCE, ST. LOUIS, MO.

At the meeting of November 2, Mr. Colton Russell spoke of "What an Entomologist Can Find of Interest about St. Louis," illustrating his remarks by numerous pinned specimens of insects, giving particular attention to the butterflies, and speaking at some length of the phenomena of periodicity, migration, polymorphism, etc., as illustrated by these insects, his paper embodying the result of a large amount of field work performed during the last ten years. Resolutions opposing the passage of the Antivivisection Bill now before the United States Senate were adopted. Three persons were elected to active membership.

WM. TRELEASE, Recording Secretary.

NOTES ON THE LIFE-HISTORY OF CERURA
OCCIDENTALIS.

BY HARRISON G. DYAR.

These notes are to complete the partial account of the life-history given in Dr. Packard's monograph.

Egg.—As usual, hemispherical with a flat base, dark black-brown, not shining; diameter 1.1 mm., height .7 mm. Reticulations neat, distinct, rounded hexagonal, smooth, not elevated, the enclosed spaces densely coarsely granular, serving to make the smooth reticulations conspicuous. Laid singly on a willow leaf.

Stage I.—Head bilobed, rather square; red-brown, the ocelli darker; width .5 mm. Dorsum of joints 3 to 12 continuously broadly greenish-yellow, the rest of the body purplish-brown; tails darker, blackish toward the base, with two sordid white rings. Cervical horns and tails spiny. Setæ normal, i. to v. and leg-plate present on the abdomen, i. a and b, ii. a and b, iv. and vi. on thorax, vi. double, ii. b not very evident. At the end of the stage the yellow band is slightly constricted at joints 6-7 and 11, horns, cervical shield, anal plate and tails darker than the now vinous body. Head light red; abdominal feet whitish, thoracic blackish; no marks.

Dr. Packard's descriptions of stages II. and III. are comparative only, so I give my notes in full.

Stage II.—Width of head .9 mm. Medial suture deep; all red-brown, uniform, smooth, the clypeal tubercles marked by yellowish dots. Dorsum to spiracles vinous brown except a yellow patch on joints 3-5 and 7 post.-10 ant., the now dark parts of the former yellow band smoky olivaceous; subventral region and legs pale yellowish; two yellow rings on the tails. Tubercles distinct, setæ dark. Cervical horns slightly spinose; length of tails 2.8 mm. During the stage the larva suffers an entire change in markings, resulting as follows: Green, an incised dorsal brown band triangular from the horns to a slight fold on the anterior part of joint 3, elliptical on joints 4 to 11, widening to the anal plate, with a very slight retraction at the incisure of joints 11-12. A yellow patch on joints 7 post.-10 ant.

Stage III.—Width of head 1.5 mm. At first much the same as at the end of stage ii. Later head reddish-brown with many pale yellow dots over the lobes; pale behind the brown ocelli. Body bluish-green, dotted with white and yellow and shaded with white in the region of the

feet; dorsal band light brown, scarcely yellowish in the centre of the large patch, slightly frosted with purplish, darker on the edge and with a narrow yellow border. The band is retracted at joint 4 to the slight single dorsal fold on joint 3 posteriorly, reaches the spiracle on joint 8, not conspicuously incised on the folds, retracted at joint 11 posteriorly, then nearly straight to the anal plate. Tails with two greenish-yellow rings; horns spiny, setæ stiff.

Stage IV.—This has not been previously described. The larva which I bred to fourth stage had the proper width of head (2.5 mm.), but it exhibited smooth cervical horns and the other characters of the final stage, thus maturing with only four stages. The coloration was as described for the full-grown larva. The structures on joint 3 which Professor French calls "tubercles" consist of a fold of skin divided by a dorsal depression into two rounded humps, not bearing any setæ.

Stage V.—Other larvæ found when full-grown had a width of head of 3.1 mm., thus indicating that five stages also occur. Dr. Packard quotes Prof. French's description of this stage, which has been already published in CAN. ENT., XIII., 144.

BOOK NOTICES.

ECONOMIC ENTOMOLOGY for the Farmer and Fruit-Grower, and for use as a Text Book in Agricultural Schools and Colleges; by John B. Smith, Sc. D. Philadelphia: J. B. Lippincott Co., 1896. (Price, \$2.50.)

It is rather remarkable, when the self-evident importance of the science of economic entomology is considered, that until Professor Smith issued his excellent manual, which has just appeared under the above title, there was no one American book which a farmer could consult to find the names and proper remedies for the common crop pests which would come regularly before him in a year's working of his land. The author, in his long experience, first as a member of the staff of the United States Entomologist at Washington, and subsequently as State Entomologist of New Jersey, has had great opportunities of becoming thoroughly informed on his subject. That he has made the best use of these opportunities is evidenced by the excellent book which he has now produced. The best way to test anything is to use it. Thus, if anyone wishes for information upon anything within the limits of economic entomology, the subject of

Prof. Smith's book, as, for instance, some one of the regularly occurring insect enemies of crops, *e. g.*, cutworms, white grubs, canker worms, the Colorado potato beetle, plum curculio, or tussock moth, etc., etc., let him turn it up in the index of this work and he will be referred to a clear and concise account of the insect and its habits, together with recommendations as to the best remedies. The identification of the different species is made easy by a profusion of remarkably good illustrations. The whole book, including the index, consists of 481 pages, while the number of illustrations is no less than 483, all of which are unexceptionable, if a mental reservation may be allowed as to the three plates of bumble bees and bee flies, Nos. 398, 464, and 473, taken evidently from photographs. It seems a pity that these plates should have been included in this work on economic entomology. They were made from very badly mounted specimens, and have no special reference to the text. The arrangement of the book, for ease of reference, is well planned and well carried out, the objects the author had in view, as explained in the introduction, being adhered to in a most satisfactory and complete manner. Part I. consists of eight short chapters on the Structure and Classification of Insects. Part II., the Insect World, which forms the bulk of the book, is a systematic treatment of the various common injurious insects in their natural orders. This portion is particularly well-balanced, enough space being devoted to each species treated of to satisfy the inquirer, without, as is sometimes the case, giving undue importance to some at the expense of others. Part III. treats of Insecticides, Preventive Remedies, and Machinery. This work cannot fail to prove of great value to the farmer and fruit-grower, as well as to the amateur gardener and student of insect life, who will find in it an authoritative book of reference of small size but comprehensive and easy to consult.

J. F.

MISSOURI BOTANICAL GARDEN — SEVENTH ANNUAL REPORT, 1896.

Very few reports are more eagerly looked for every year by those who are lucky enough to secure copies than Prof. Trelease's report on the Missouri Botanical Garden and the Henry Shaw School of Botany at St. Louis, Mo. This report contains not only the Director's annual statement on the condition of the Garden and its finances, but also valuable monographs on different genera of plants. In the present volume we find the following: (1) *The Juglandaceæ of the United States*,

by Prof. Trelease ; (2) *A Study of the Agaves of the United States*, by A. Isabel Mulford ; and (3) *The Ligulate Wolffias of the United States*, by C. H. Thompson. A feature of all these annual reports is the magnificent illustrations.

In addition to the above there is the report of a speech delivered at the sixth annual banquet, by President Henry Wade Rogers, of the Northwestern University, on "The Value of a Study of Botany," and a catalogue of the Sturtevant Pre-Linnean Library, the greater part of which was presented to the Botanical Garden by Dr. E. Lewis Sturtevant in 1892.

One very notable omission from the present volume, which we much regret, is the printing of the annual "flower sermon." Last year it was delivered by the Rt. Rev. W. C. Doane, Bishop of Albany.

The first annual event provided for in his will by Henry Shaw, the good man who founded this garden for the enlightenment and happiness of his fellow-men, was "The preaching of a sermon on the wisdom and goodness of God as shown in the growth of flowers, fruits, and other productions of the vegetable kingdom." A lovely poem in prose, for the perusal of which by his friends the writer's copy of the 1893 report is in constant use, is a sermon preached by the Rev. Cameron Mann from the text, "Consider the lilies of the field." This sermon, from a literary standpoint, is charming, and certainly helps to carry out the wise wish of the benevolent founder to inculcate in all a thankful spirit for the many lovely things in the vegetable kingdom which we find strewn with no niggard hand along our walk through life, making our own journey more beautiful and, it is hoped, our friends happier from contact with us.

J. F.

THE CRAMBIDÆ OF NORTH AMERICA ; by C. H. Fernald, A. M., Ph. D., Mass. Agr. College. Jan., 1896. Pp. 81, with six plates.

This latest work is characterized by the painstaking study which Prof. Fernald has taught us to expect in his publications. The statements are well considered; the very words carefully chosen, so that there are few writers whom we may so entirely and unhesitatingly trust. Conscious as I am of my own shortcomings, that attention has been called to the "extreme desirability of verifying my statements when they involve a change in nomenclature or in synonymy," it is like an atonement for my thirty-five years of labour, without any merit of my own, that I reached so unimpeachable an observer as Prof. Fernald a friendly hand

at the beginning of his career among the little moths. And it is grateful to me, but quite out of the usual course, that Prof. Fernald should have remembered the circumstance. I thank him heartily. As I sat down to write this notice and was seeking for the proper words, a letter was brought in from a well-known and able German writer on the "*Tineides*," thanking me for sending him a copy of "Prof. Fernald's full and satisfactory work on the American Crambidae." It is certainly exactly this, and I need not seek further for adjectives. The appearance of being written quite easily, which Prof. Fernald's work bears, is deceptive. It has been all thought out and written over.

My own studies in the Crambids may give a little weight to a word of general praise and entitle me to offer some comments. The synoptic table and exact definitions will enable the student to identify his material even without the aid of the finely drawn and delicately coloured plates (the figure of *edonis* is perhaps too delicately coloured—I miss the "salmon pink"). But here and there we might easily have had, in addition, more comparative details, to enable one to seize readily important characters and bring the inter-relationships to light. The sequence of the descriptions of the species of *Crambus* is not that of the synoptic table, and it is not clear upon what principle it is laid down. In the absence of structural characters, we have the markings upon which to group the species. First there are the white species (*perlellus*, *girardellus*, etc.), reminding us of *Argyria*. Then the leather-brown species, with a white median stripe cut into blocks, *myellus*, *luctuellus*, *dissectus*. Then what may be considered the typical Crambids, species with gilded and fuscous primaries, with longitudinal subcostal satiny-white striping, *satrapellus*, *leachellus*, *carpenterellus*, *laqueatellus*, etc., etc.; again, with the stripes wanting, *vulgivagellus*, *behrensellus*, etc. These seem to pass, through forms like *attenuatus*, into the plain, gray, or fulvous species, with double, dark and bent transverse lines, such as *laciniellus*, *caliginosellus*, *luteolellus*, *anceps*, *undatus*, etc. Then we have the blackish and white species like *labradoriensis* and *oregonicus*, while a number of peculiarly marked forms lead us, through *dimidiatellus*, to the species of *Thaumatoopsis*. But this rough sketch of a possible arrangement is entirely suggestive. I may conclude with a few words upon three species. On Plate III., fig. 15, Prof. Fernald gives us a representation of *Crambus inornatellus*. But no mention is made of this pale yellowish form on page 43, where it is referred to merely in the synonymy of *perlellus*. It is nearly twenty

years since I went over the literature, but I believe Clemens describes *luteolellus* without the lines. If so, then *duplicatus* might be kept for the form with lines, of which *ulæ*, according to Prof. Fernald's figure, would be a sub-variety. It was with feelings of perplexity and annoyance that I found, on page 87 of the Philadelphia List, my *Crambus dimidiatellus* referred as a synonym of *T. pexellus*. The beautiful species is now rehabilitated, while I miss, what Prof. Fernald probably thinks is unnecessary, a word upon the circumstance. This is already the fifth name which has been restored to me, and for those who profess to consider such matters sentimental or unscientific, I should say that to me they are very important, and the distress inflicted by a careless or prejudiced reference is real. Schrank, in 1802, uses *Tinea* in the sense of *Crambus*; I miss an allusion to this in the "History," p. 4. Prof. Fernald has given us since 1884, in addition to catalogues and descriptive papers, four pamphlets on the Insects and Grasses, chiefly of Maine and the Eastern States. The fifth is this on the Crambids. I value all of them very highly. They are bound together and, as I turn over the leaves here in my study, separated by such miles of land and water from the one reality of my existence, I call to mind scenes and faces I may never behold again.

A. RADCLIFFE GROTE.

Roemer Museum, Hildesheim, Germany.

CLASSIFICATION OF THE GEOMETRINA OF NORTH AMERICA, with descriptions of new genera and species; by Rev. Geo. D. Hulst. Trans. American Entomological Soc., Vol. XXIII., pages 245 to 386, plates x. and xi. (1869).

The bulk of this paper consists of descriptions of 82 new genera and 143 new species, most of them from the West. That such an assemblage of new forms can be described in a single paper shows the imperfect state of our knowledge of the family.

The most valuable part of Dr. Hulst's work consists in the tabular synopsis of subfamilies and genera. The characters used seem contrasting and reasonably constant, so that these tables fill a long-felt want. In fact, the article forms the skeleton of a complete monograph, lacking only synoptic tables of species with descriptions of the old ones, bibliography and larval descriptions.

Dr. Hulst calls the group Geometrina, but in the opinion of the reviewer this term is not warranted. We may accept Dr. Hulst's two

families, Geometridæ and Ennomidæ, as consecutive groups of the Bombyces, discarding the superfamily term. However, as used by Dr. Hulst, this term may be only a convenient heading for the article.

The author is in some difficulty to separate the "Geometrina" from the other groups of Lepidoptera, and has to fall back on larval characters. He says: "The larva has one or more pairs of the anterior abdominal legs wanting, and they are thus distinguished from the Bombycina in the widest reach of that term." Yet this is not correct, since *Brephos*, included in the "Geometrina," has all the abdominal feet present, while *Nola*, excluded, entirely lacks the anterior pair.

In the classification Meyrick is followed, as Dr. Hulst considers his "in many respects by far the best yet proposed." Hübner's *Verzeichniss* receives recognition, but not the *Tentamen*. However, the *Tentamen* names are included in parentheses, so that any one differing in his opinion of the value of these names may easily apply them.

On the whole, Dr. Hulst's paper indicates a distinct advance in our knowledge of the Geometridæ.

HARRISON G. DYAR.

INSECT LIFE.—A short account of the classification and habits of insects; by F. V. Theobald, M. A., F. E. S. London: Methuen & Co. Pp. 235. (2s. 6d.)

Under the title of the "University Extension Series," the publishers are issuing a number of books on historical, literary, and scientific subjects, which are intended to be both popular and scholarly. We have not seen any of the other works of the series, and cannot, therefore, comment upon them, but the book before us seems hardly to come up to the expectations one would naturally form of a manual intended for use in preparation for "University Extension" lectures. The descriptive portion is meagre, and will afford a student a very vague idea of the insects belonging to the different orders. It is satisfactory, however, to find in an English publication some attention paid to economic entomology and the application of the insecticides which are in common use here. The book is neatly printed (though we have noticed several misprints in the spelling of names) and is illustrated with over fifty wood cuts.

C. J. S. B.

MR. WALTER W. FROGGATT has been appointed Entomologist to the Department of Agriculture, Sydney, New South Wales, Australia, in place of the late Mr. A. S. Olliff, F. E. S.

BRITISH BUTTERFLIES; by J. W. Tutt, F. E. S. London: George Gill & Sons, 1896. Pp. 469. (Price, 5s.)

It is only a few months since we spoke in terms of commendation of Mr. Tutt's Manual of the British Moths, and now we have before us an even better work on the butterflies by the same industrious author. About one-fourth of the book is taken up with the general subject, presenting a series of chapters on the four life-stages of butterflies, their variation and its causes, hibernation and æstivation, classification, collecting, and arranging and preserving specimens, and the inflation of larvæ. These are written in the author's pleasant, easy style, with which his previous works have made us familiar, and convey much information of interest to butterfly-hunters anywhere. We are glad to observe that he insists very strongly upon the importance of labelling specimens with the place and date of capture; though the English mode of using short pins and setting the specimens low down makes this a matter of difficulty.

The descriptive portion of the work is excellent and much more complete than that of any manual of British butterflies that we have met with. In the case of each species there are given the English and scientific names, reference to the plate where it is figured, synonymy and bibliography, a concise description of the imago, a paragraph on "variation" in which are mentioned any known aberrations, forms or varieties, as well as sexual distinctions, descriptions of the egg, larva, pupa, notes on the time of appearance, habitat, and geographical distribution. Thus it will be seen that proper regard is paid to the whole life-history of the insect, and that the author does not confine his attention to the imago alone. The plates (uncoloured) on which each species is depicted are admirable, and should enable any collector to identify his specimens without difficulty; there are also a considerable number of wood cuts throughout the text.

In the arrangement of species the author begins with the "lowest"—the Skippers, Hesperidæ—and proceeds upwards to the Satyridæ, among which he strangely places "the Purple Emperor," *Apatura iris*. His classification, a thorny subject which we do not propose to discuss here, may thus be considered fully "up to date."

To our readers in the British Isles, and to those who have collections of British butterflies, we heartily commend this excellent Manual. We only hope that it may not be very long before we have some handbook equally good dealing with the butterflies of Canada. C. J. S. B.

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